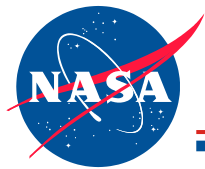


ENVIRONMENTAL GEOGRAPHIC INFORMATION SYSTEMS (EGIS) at STENNIS SPACE CENTER (SSC)



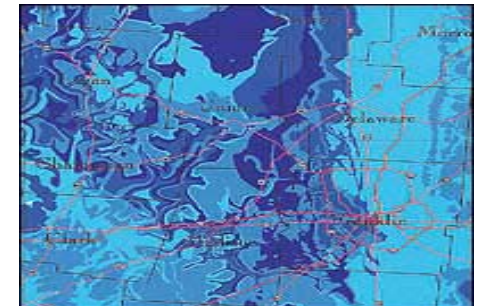
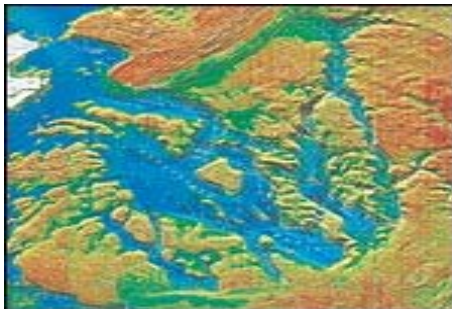
**Hugh Carr, Doc Smoot, Joy Parikh
NASA Environment and Energy Conference
Wednesday, May 26, 2004**



OBJECTIVE

Stennis Space Center

- Background of SSC Environmental GIS (EGIS)
- Principal Center Activities
- SSC's GIS Applications
 - Environmental Emergency Response Tool
 - CERCLA
 - Facilities Master Planning
 - Natural Resource Management and Site Assessment



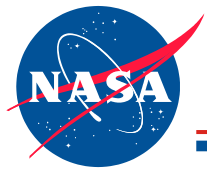


STENNIS SPACE CENTER

Stennis Space Center

Landsat ETM Data

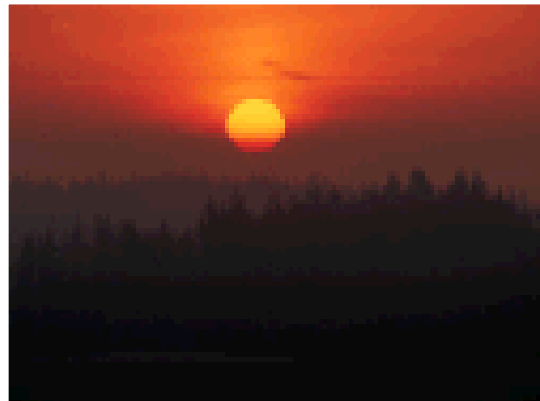
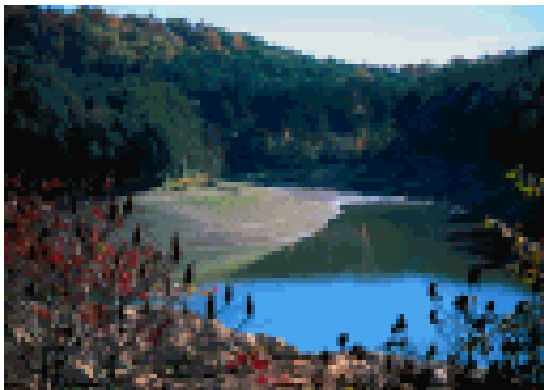


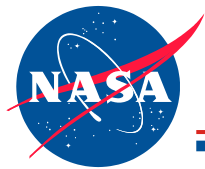


INTRODUCTION

Stennis Space Center

- As a Federal agency, NASA is subject to the environmental provisions of:
 - National Environmental Policy Act (NEPA)
 - Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA or Superfund)
 - National Historic Preservation Act
 - Endangered Species Act (ESA)
 - Resource Conservation and Recovery Act (RCRA)





INTRODUCTION

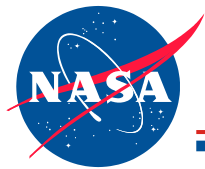
Stennis Space Center

- These regulations often require reports, maps, models, and quantitative measurements of:

- Chemical Use
- Wastewater discharge
- Air Emissions
- Environmental Assets
- Natural Resources
- Cultural Resources



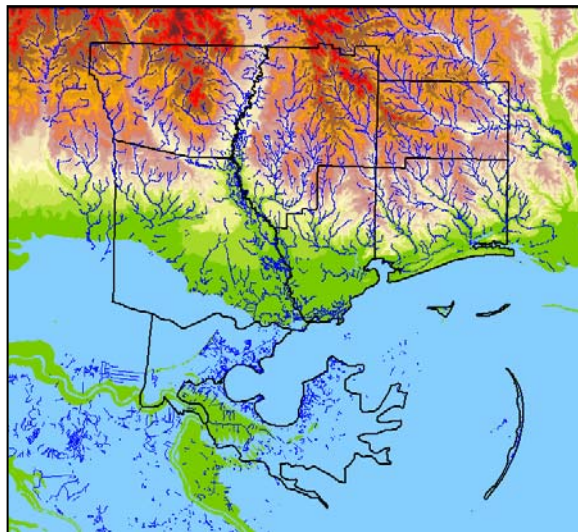
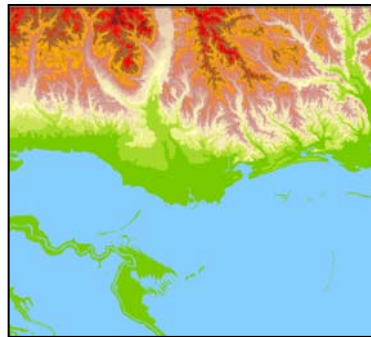
Consequently, there is a demand for tools that consolidate ecological, cultural, and geological information into one central resource to facilitate environmental management and informed decision making

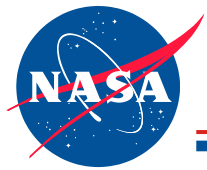


GEOGRAPHIC INFORMATION SYSTEMS

Stennis Space Center

GIS is a *system* of computer software, hardware data, and personnel capable of displaying, analyzing, and modeling geographically referenced information. This tool allows for the storage and analyses of vast amounts and various kinds of geospatial data.



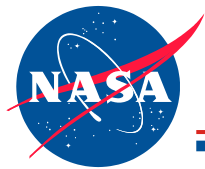


BEGINNING of SSC EGIS

Stennis Space Center

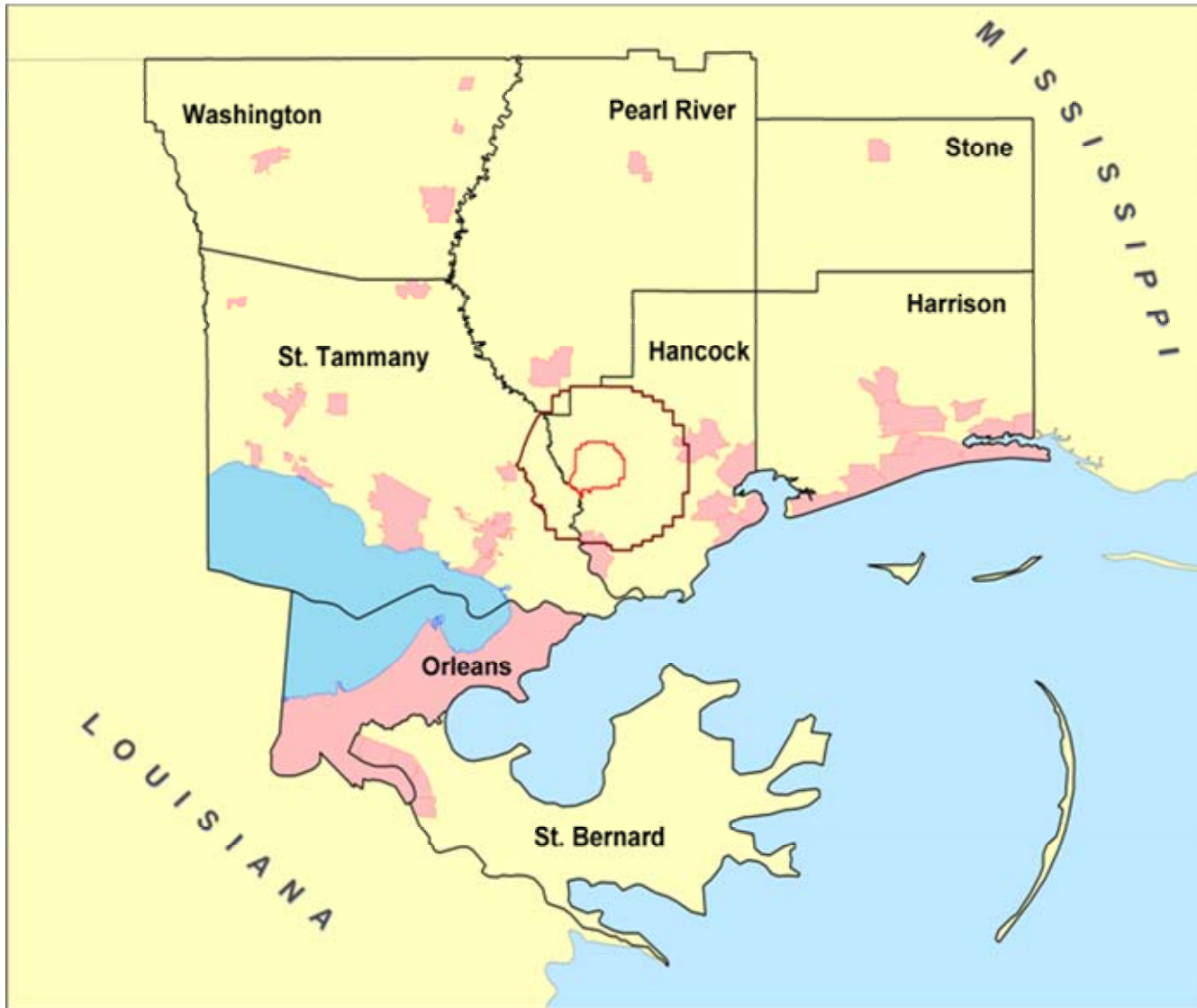
- NASA Environmental Office
 - Assess and monitor impacts of onsite activities
 - Environmental Justice
 - Propulsion testing
- Building the database
 - Incorporated data collected for the Advanced Solid Rocket Motor Program (ASRM)
 - Primarily included data of the Center
 - Procured data from government information sources



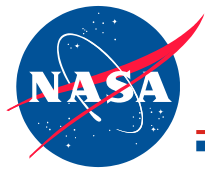


EXTENT OF EGIS

Stennis Space Center



- Four counties in Mississippi and four parishes in Louisiana
- Over 400 data layers including vector and raster data from various public and private sources
- Over 100GB of data



ORGANIZATION OF DATA LAYERS

Stennis Space Center

Hydrology

Represents the classification and use of surface and subsurface water

Subsurface

Wells

Surface

Hydrologic Units/Subunits
Water Bodies
Rivers/Streams

Infrastructure

Represents cultural features that support the basic activities of "modern" life.

Transportation

Roads
Railroads

Utilities

Natural Gas Pipelines

Cadastral/Geodetic

Represents the locational information required to define the geographic position of a place or feature

Public Land Survey System (PLSS)

Sections
Subdivisions
Townships
Parcel Boundaries

Referencing System

1:24,000 Quadrangle Grid
1:100,000 Quadrangle Grid

Physical Geography

Represents the conditions reflecting the natural environment

Land Characterization

Land Use
National Wetlands Inventory (NWI)
Q3 Flood
Vertebrate Species Locations
Threatened & Endangered Species Habitats

Physiography

Soils
Surface Geology
Contours
Elevation

Geo-Political

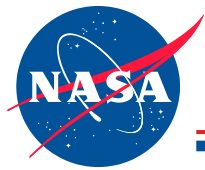
Represents the various boundaries used or defined by federal, state and local units of government

Administrative

State Boundaries
County Boundaries
Census Places
Stennis Space Center Boundaries
Public School District
County Zoning Boundaries

Political

Senate Districts
House of Representatives District
Voting Precincts
Zip Code Boundaries



ORGANIZATION OF DATA LAYERS

Stennis Space Center

Socio-Economic

Represents the aspects of human society covering past and current conditions

Census Data

- Block Groups
- Census Tracks
- Census Demographics

Cultural

- Hospitals
- Schools
- Public Colleges and Universities
- Buildings/Parking Lots
- Archaeological Sites

Environmental

- Hydrogen Tanks
- Acoustic Levels

Remote Sensing Data

- Landsat Thematic Mapper (30 Meter)
- Spot (20 Meter)
- Radarsat (12 Meter)
- ATLAS (2.5 Meter)
- Star3i (2.5 Meter; 10 Meter)
- AVIRIS (2 Meter)
- Positive Systems (1 and 3 Meter)
- IKONOS (1 and 4 Meter)

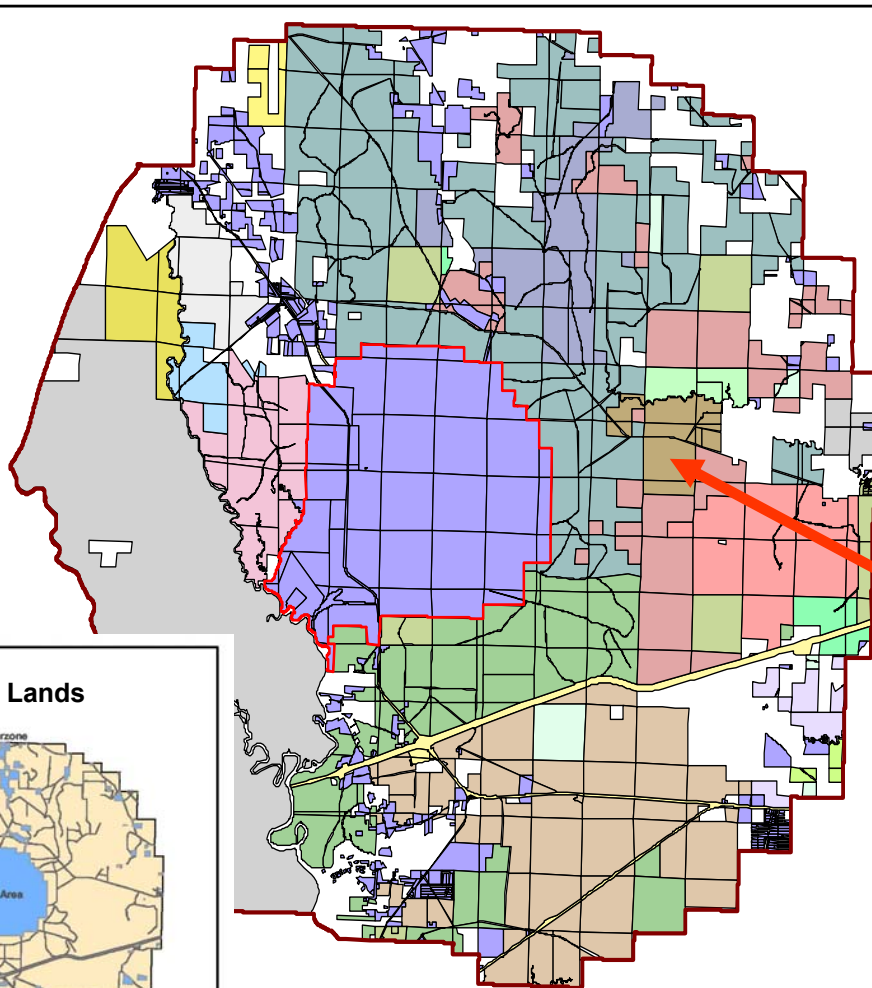
Data Providers & Collaborators

- NASA Center Archive
- US Census Bureau
- US Geological Survey
- FEMA
- Soil Conservation Service
- US Corps of Engineers
- US Fish and Wildlife Service
- Tax Assessor's Office
- Planning Commission
- Coastal Environments, Inc.
- Department of Marine Resources
- Gulf Regional Planning Commission
- Dept of Environmental Quality
- Universities and Colleges



LAND OWNERSHIP FROM HCTA

Stennis Space Center



Source: Hancock County Tax Assessor's Office COE

Property Ownership

- # Owner's Name
- # Owner's Address
- # Parcel Acreage
- # Legal Description

- Fee Area
- Buffer Zone
- Parcels
- Louisiana Department of Wildlife and Fisheries
- Prutimber Fund One

Parcel Number: 079-0-32-002.00
Owner: Boelte, Gerald A.
Legal Description: Section south of Texas Flat Rd.
Total Acreage: 1601

- B & W Materials
- Kimberly-Clark Tissue Company
- Gerald A. Boelte
- State of MS Highway Dept.
- Richard D. Burge, Jr., et al
- H H White Limited Partnership, et al
- William B. Whitfield, et al
- Live Oak Plantations, Inc.
- Richard F. Mestayer III, et al
- Harold H. White III, Trustee, et al
- L Osmond Crosby, Trustee, et al
- Jack Lott

Federal Lands



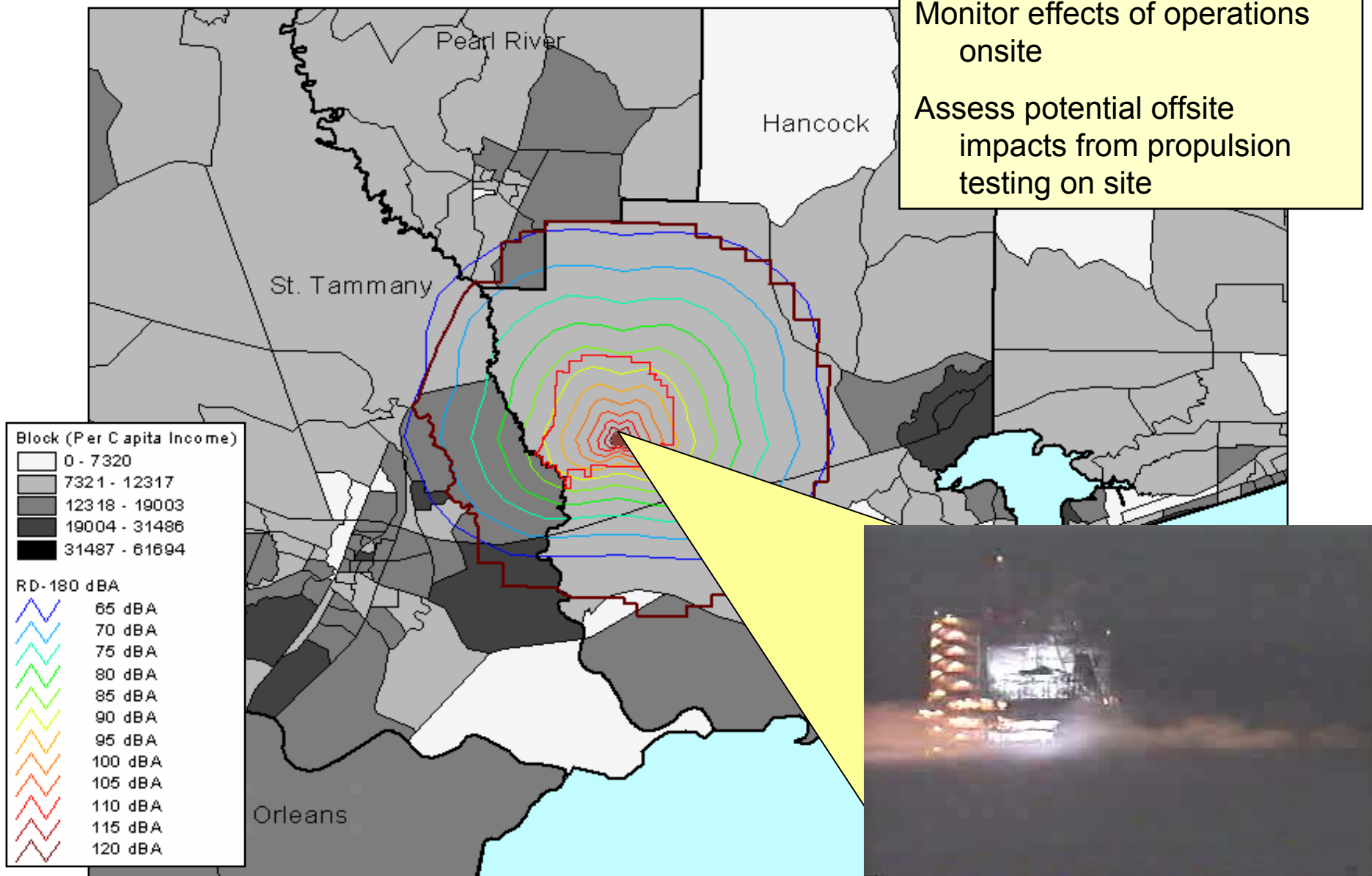


NOISE POLLUTION MODELING

Stennis Space Center

Monitor effects of operations onsite

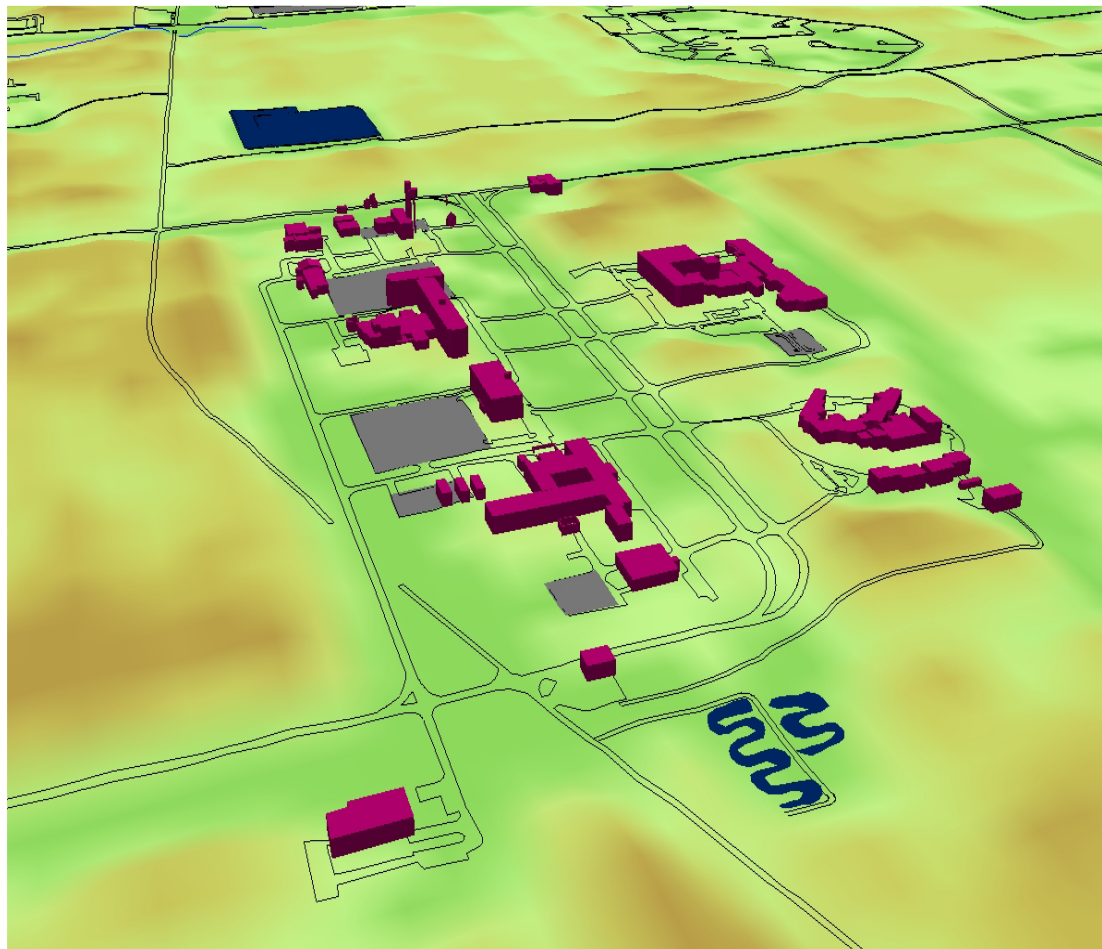
Assess potential offsite impacts from propulsion testing on site





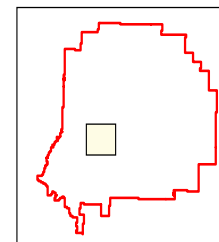
INFRASTRUCTURE

Stennis Space Center



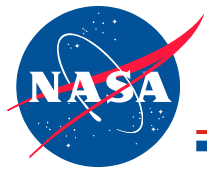
Infrastructure

- # Improved Roads
- # Unimproved Roads
- # Railroads
- # Buildings
- # Parking Lots



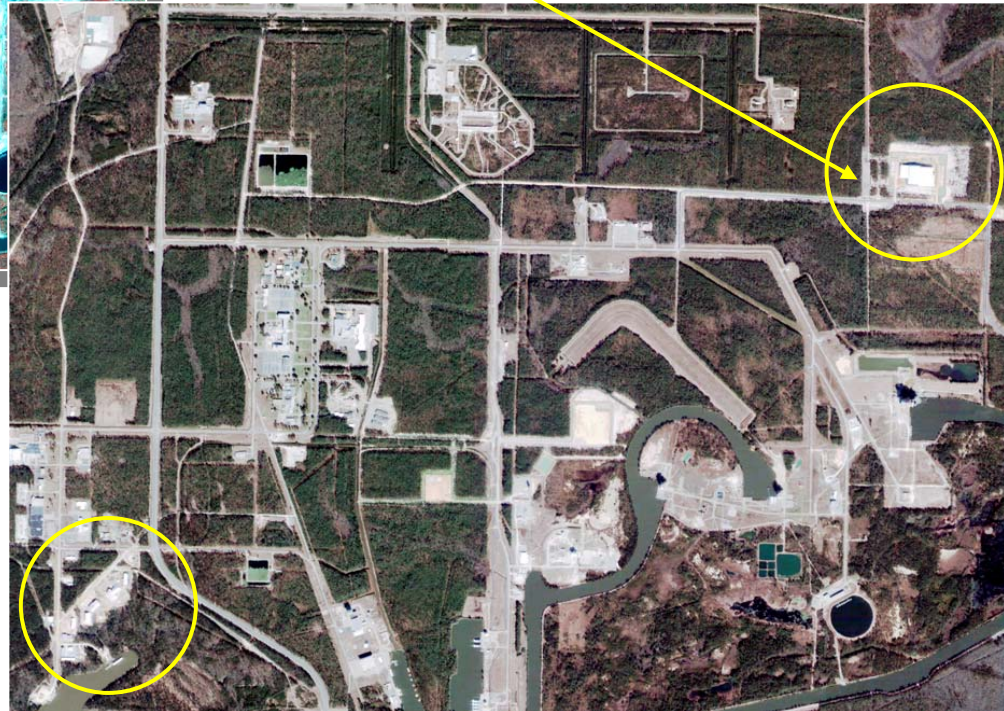
- SSC Buildings
- SSC Parking Lots
- Water Bodies

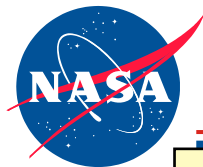
- Improved Roads
- Unimproved Roads
- Railroads



SSC LANDUSE CHANGE

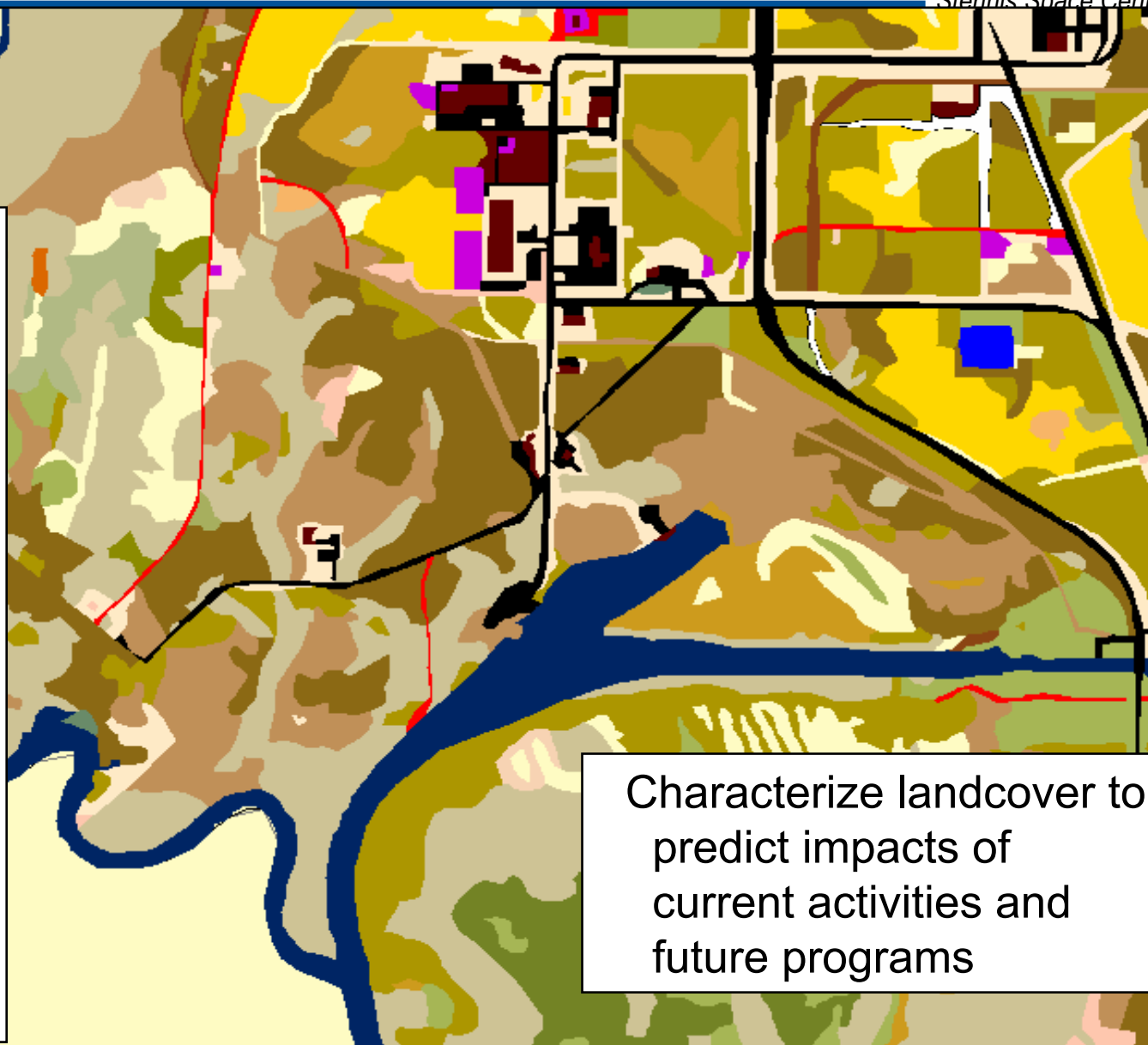
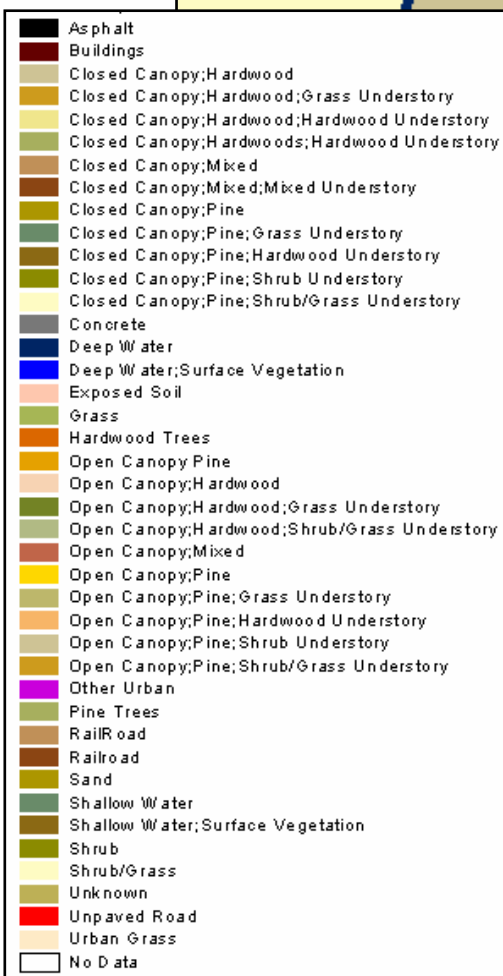
Stennis Space Center



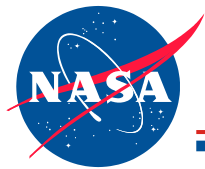


LANDCOVER ASSESSMENT

Stennis Space Center



Characterize landcover to predict impacts of current activities and future programs



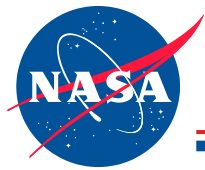
SSC: PRINCIPAL CENTER for EGIS

Stennis Space Center

In May 2000, Stennis Space Center was designated as the Principal center for support of NASA's Environmental GIS activities.

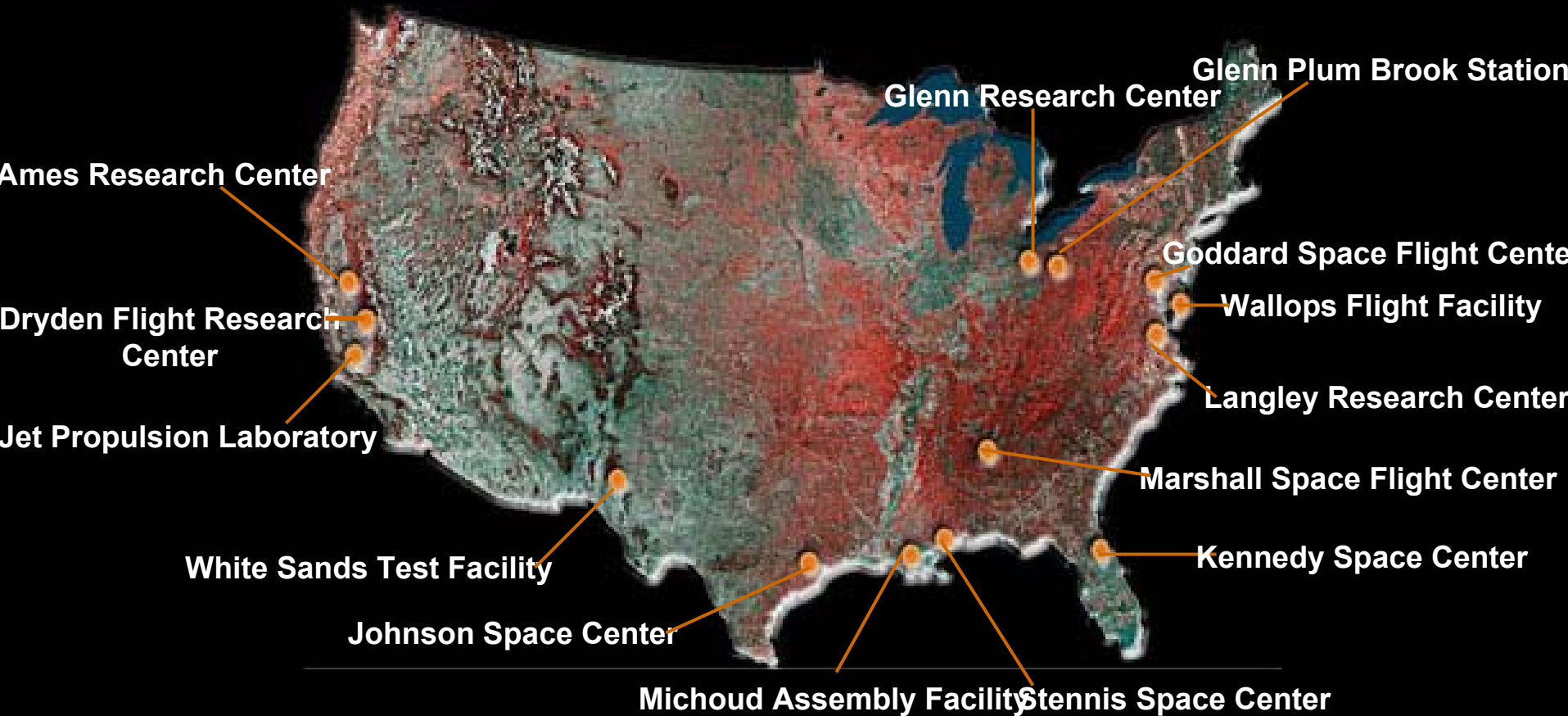
SSC has led a NASA-wide effort to develop and deliver a baseline EGIS for each of NASA's 14 field centers and component facilities. These databases were designed to support NASA's Environmental Management Program.

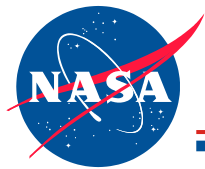




EGIS DELIVERED TO FIELD CENTERS

Stennis Space Center



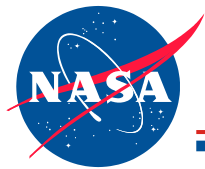


PRINCIPAL CENTER ACTIVITIES

Stennis Space Center

- Five-year MOA; currently in 4th year
- Collaborate with NASA field centers to develop requirements
- Designed, delivered, installed baseline EGIS database, IKONOS imagery, and metadata to each Center
- Customized, delivered, installed agency-wide emergency response application to four centers

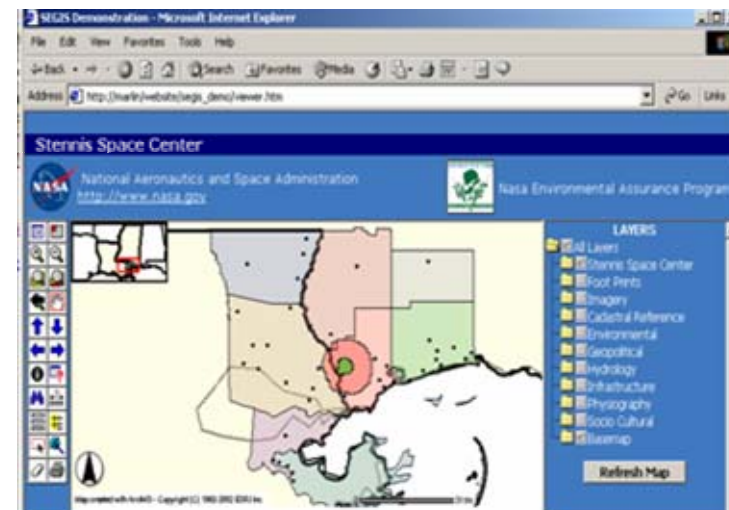
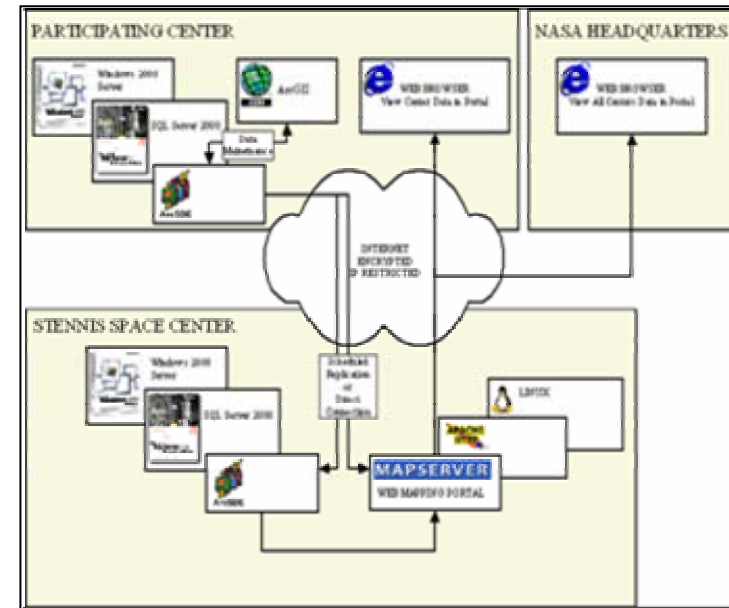


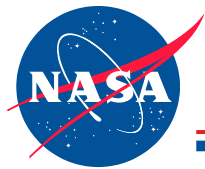


FY04 PRINCIPAL CENTER ACTIVITIES

Stennis Space Center

- Web-based Agency-wide EGIS Portal connecting NASA HQ to select Field Centers
- Building upon the original EGIS databases
- Initially includes SSC, MSFC, KSC, GRC, GRC-PBS
- Password protected, query, display, analysis capabilities, electronic data exchange
- Future efforts: integration of other NASA Field Centers and development of NASA-Wide Web applications

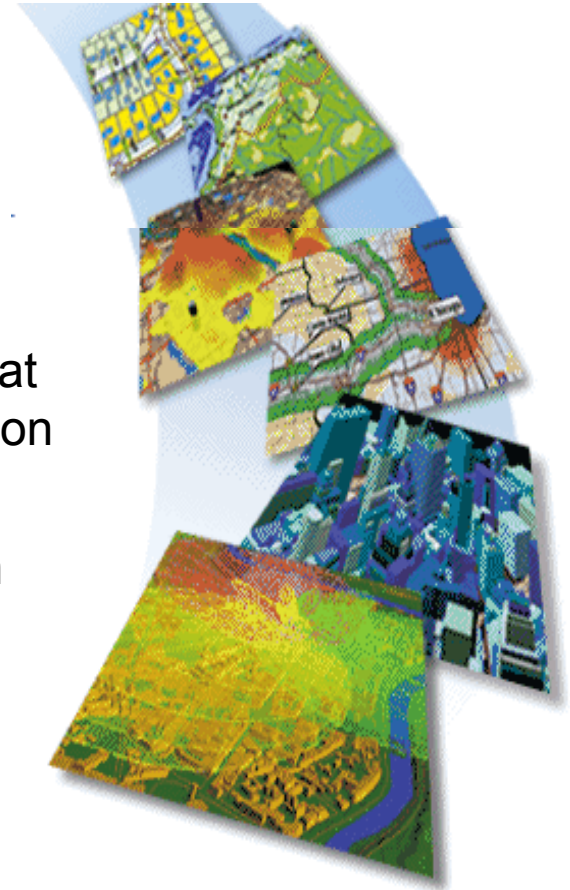


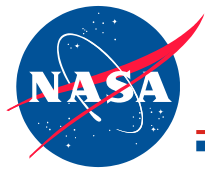


SSC ENVIRONMENTAL GIS APPLICATIONS

Stennis Space Center

- Emergency Response/Disaster Preparedness
 - Emergency Environmental Response Tool (EERT)
- Facilities Management and Master Planning
 - Conversion of CADD data to GIS format
 - Development of a web-based application
- Groundwater Monitoring and Chemical Remediation
 - CERCLA
- Resource Management and Site Assessment





EMERGENCY ENVIRONMENTAL RESPONSE TOOL (EERT)

Stennis Space Center

An Environmental Response application was developed at SSC to support NASA's emergency response and preparedness requirements. This application provides the ability to effectively plan, manage, and coordinate environmental emergency incidents and facilitate data sharing among onsite personnel to provide near real-time management capabilities.

The Environmental Office in conjunction with the Fire Department, Security Office, and Facilities Management Office can use EERT to develop a comprehensive emergency management plan in the event of a major chemical release.

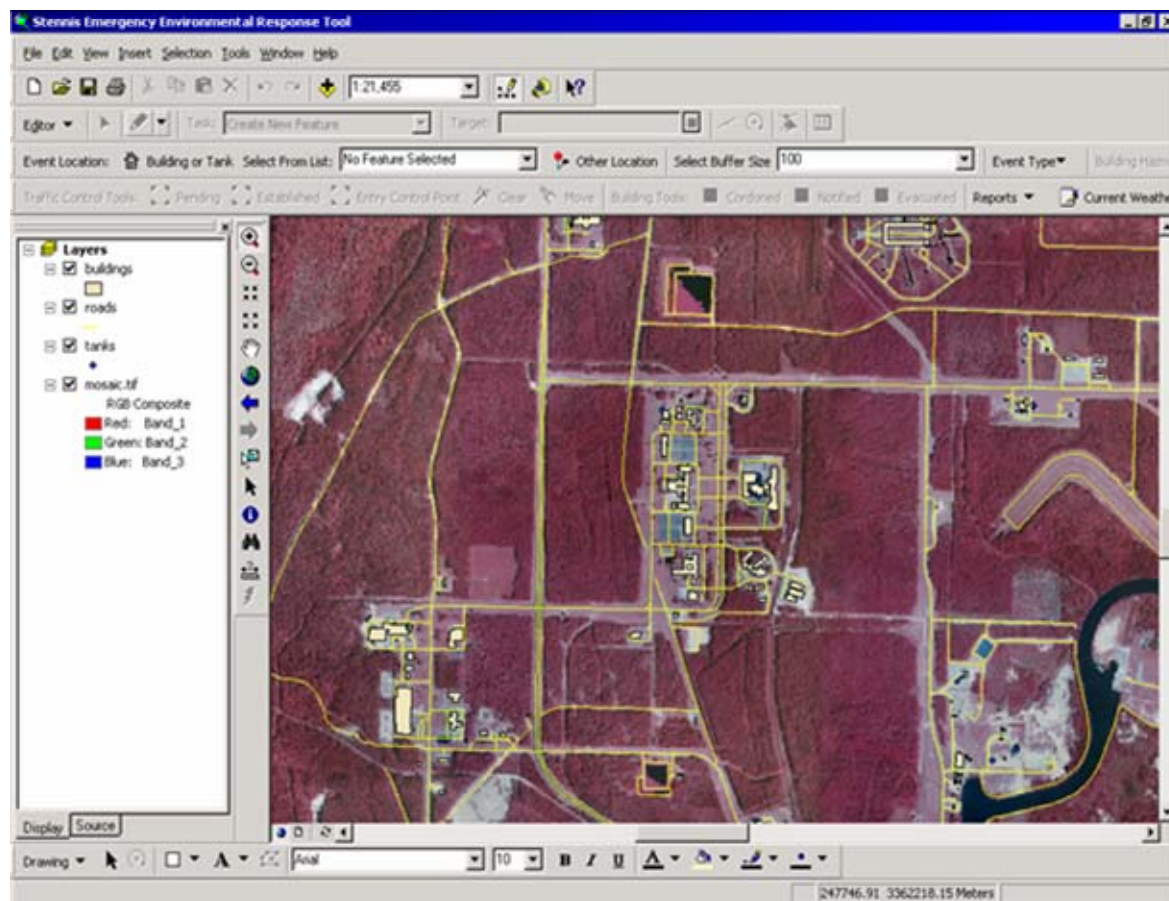


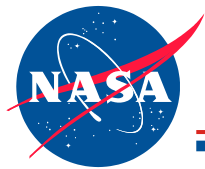


ENVIRONMENTAL EMERGENCY RESPONSE TOOL (EERT)

Stennis Space Center

- Interfaces with ALOHA (Areal Locations of Hazardous Atmosphere) model and chemical inventory to plot plume dispersion
- Incorporates real-time weather information to display wind speed and direction; provides notification of major changes
- Establishes and geographically plots security perimeters
- Updates and monitors the status of impacted buildings and traffic control points





INCIDENT SIMULATION

Stennis Space Center

Event Location: Building or Tank Select From List: BLDG 1103 Other Location Select Buffer Size 600 Event Type▼

Chemical
Evacuation Only
New Scenario

3. Set Event Type

1. Select Location

2. Set Buffer Size

Stennis Emergency Environmental Response Tool

File Edit View Insert Selection Tools Window Help

1:4,478

Event Location: Building or Tank Select From List: BLDG 1103 Other Location Select Buffer Size 600

Traffic Control Tools: ☐ Pending ☐ Established ☐ Entry Control Point Clear Move Building Tools: ☐ Cordoned ☐ Notified ☐ Evacuated

Layers

- ☒ buildings
- ☒ roads
- ☒ tanks
- ☒ mosaic.tif
 - RGB Composite
 - Red: Band_1
 - Green: Band_2
 - Blue: Band_3

Display Source



INPUTS

Stennis Space Center

Chemical Type

Chemical Information

CAPRYLYL CHLORIDE	Select Cancel Add Modify Delete Help
CARBON DIOXIDE	
CARBON DISULFIDE	
CARBON MONOXIDE	
CARBON TETRABROMIDE	
CARBON TETRACHLORIDE	
CARBONYL FLUORIDE	
CARBONYL SULFIDE	
CARENE	
CHLORAMINE	
CHLORINE	
CHLORINE DIOXIDE	
CHLORINE PENTAFLUORIDE	
CHLORINE TRIFLUORIDE	

Atmospheric Information

Atmospheric Options

Wind Speed is : ☒ Knots ☐ MPH ☐ Meters/sec

Wind is from : Enter degrees true or text (e.g. ESE)

Measurement Height above ground is:

☐ ☐ OR ☒ enter value : ☐ Feet ☒ Meters

Ground Roughness is :

☒ Open Country OR ☐ Input Roughness [Z₀] : ☐ in ☒ cm

Select Cloud Cover :

☒ ☐ ☐ OR ☐ enter value : [0 - 10]

complete cover partly cloudy clear

Specific Conditions

Tank Size and Orientation

Select tank type and orientation:

☒ Horizontal cylinder

☐ Vertical cylinder

☐ Sphere

Enter two of three values:

diameter ☒ feet ☐ meters

length

volume ☒ gallons ☐ cu feet



GENERATED REPORTS

Stennis Space Center

```
Buildings.txt - WordPad
File Edit View Insert Format Help

**** BUILDING STATUS REPORT ****

Report Date: 7/26/2002 Report Time: 1:15:01 PM

Building Number: 1100
Building Status: Notified
Point of Contact: Jerry Bower
POC Phone Number: 688-5881
POC Agency: USN/ROICC

Building Number: 1100
Building Status: Notified
Point of Contact: Glenda Schornick
POC Phone Number: 688-1704
POC Agency: NOAA/NDBC

Building Number: 1100
Building Status: Notified
Point of Contact: Tina Reid
POC Phone Number: 688-2451
POC Agency: NOAA/NDBC

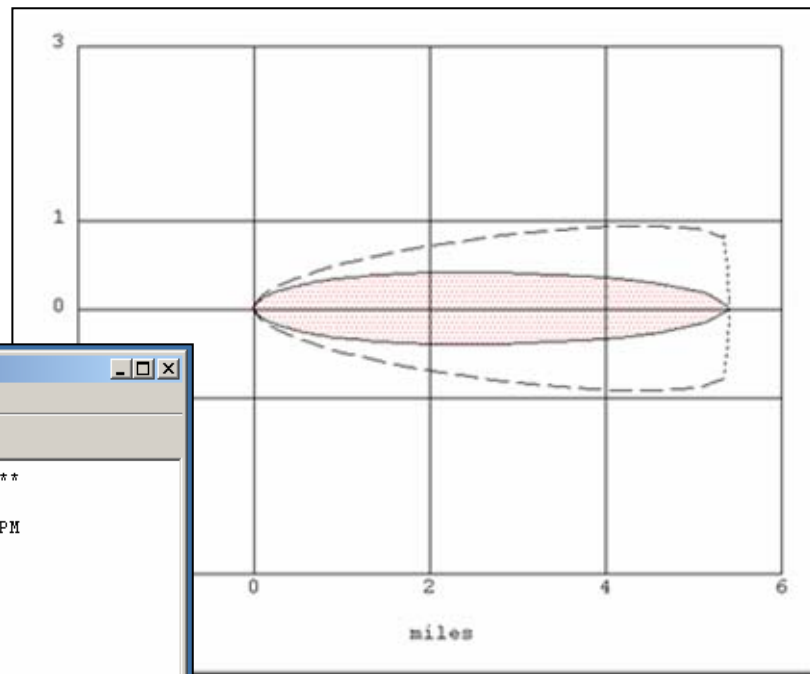
Building Number: 1100
Building Status: Notified
Point of Contact: Bob Cage
POC Phone Number: 688-7431
POC Agency: NOAA/NDBC
```

```
TrafficControl.txt - WordPad
File Edit View Insert Format Help

***** TRAFFIC CONTROL POINT REPORT *****

Report Date: 7/26/2002 Report Time: 1:12:35 PM

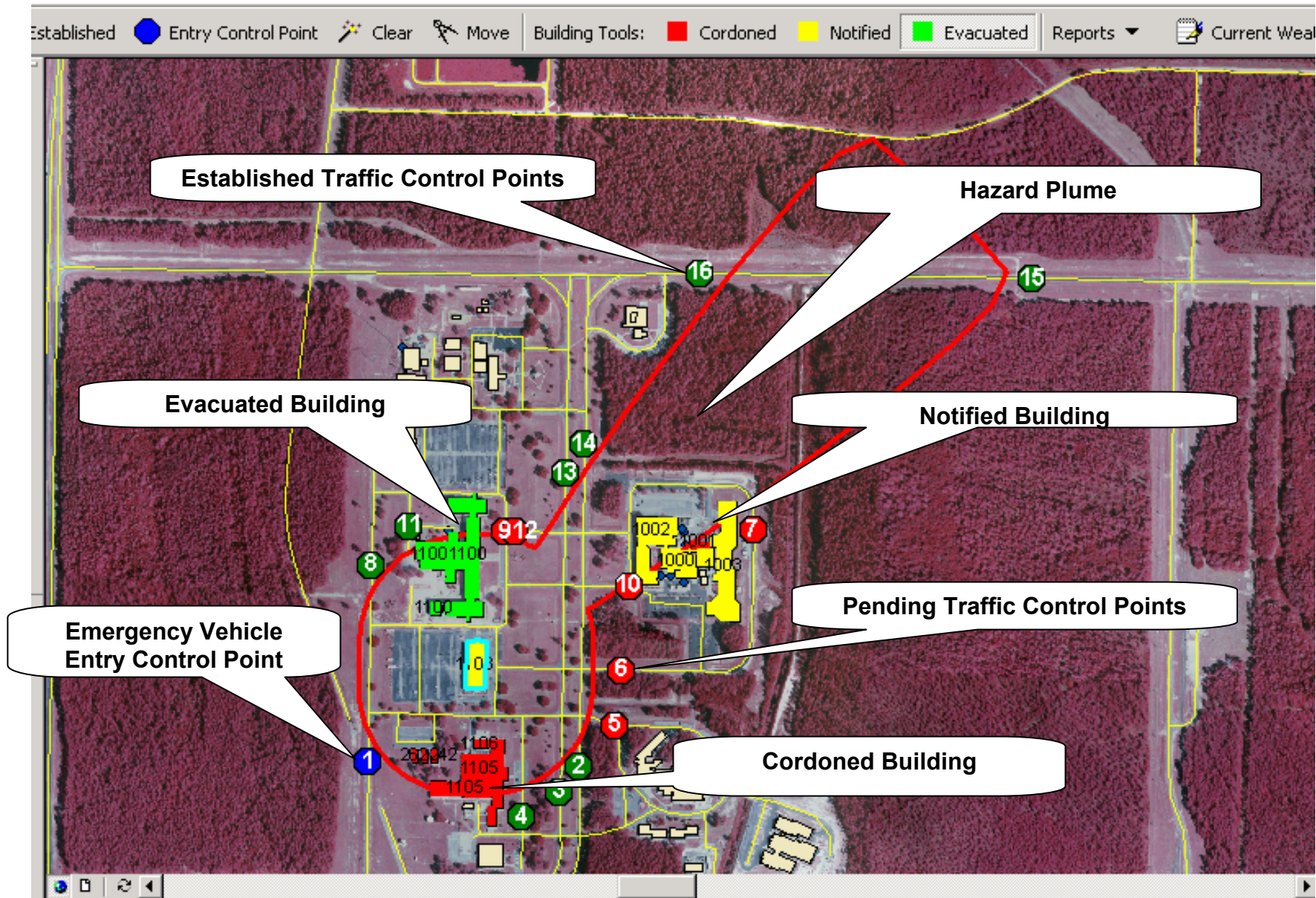
TCP_IDSTATUS      NAME
1 Entry Control Point Road C
2 Pending          Balch Boulevard
3 Entry Control Point Balch Boulevard
4 Established       1105 Frontage Access and Parking
5 Pending          NRL Access and Parking
6 Pending          NAVO Access and Parking
7 Established       Road C
8 Established       1100 Frontage Access and Parking
9 Established       Balch Boulevard
10 Pending          Balch Boulevard
11 Established      1100 Access and Parking North
```

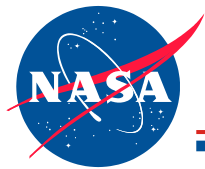




FINAL PRODUCT

Stennis Space Center

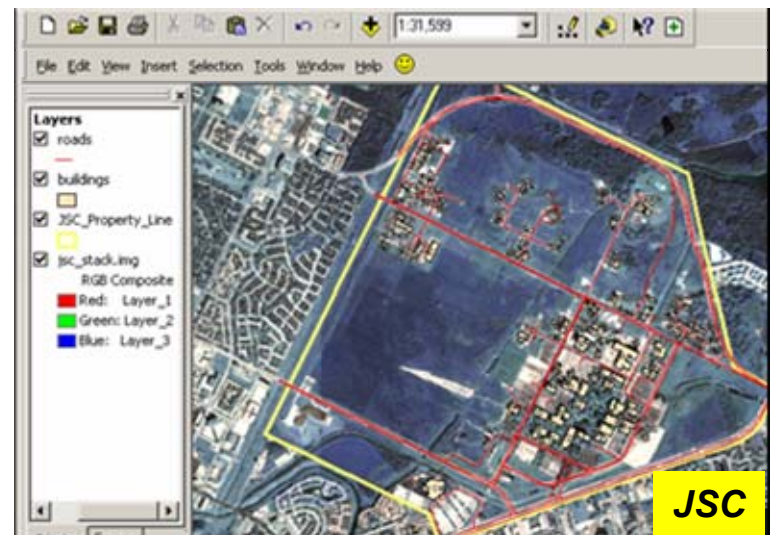
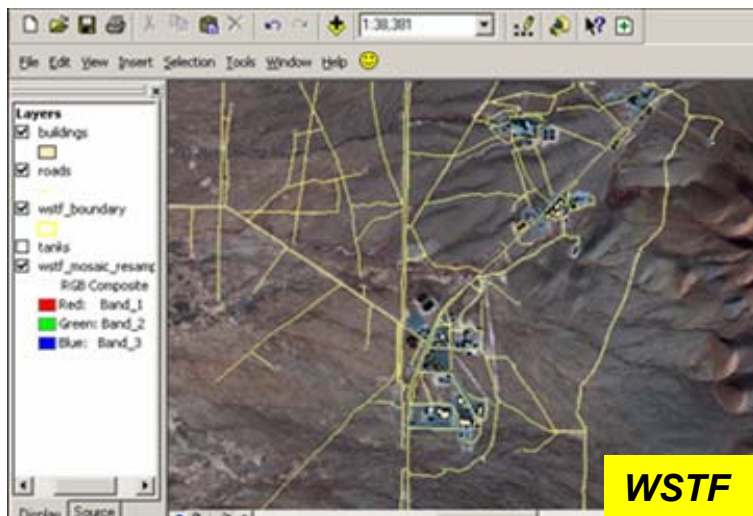
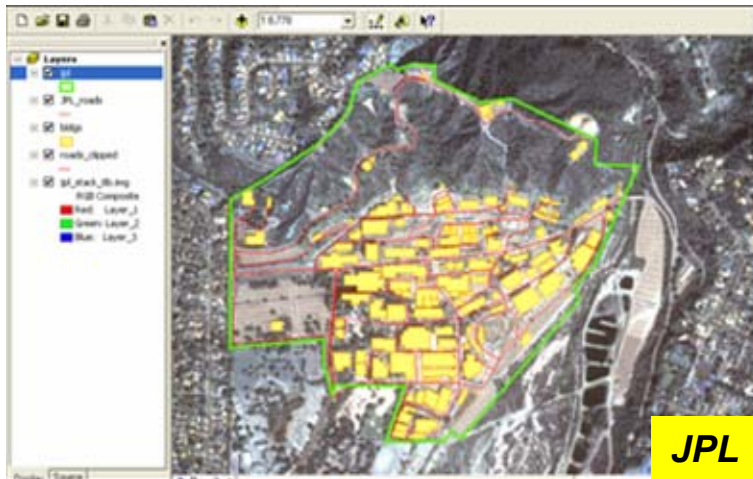


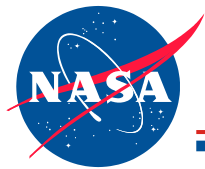


EERT INTEGRATION AT NASA

Stennis Space Center

Developed a uniform application that allows NASA Centers to work together more efficiently, thus improving overall coordination and collaboration

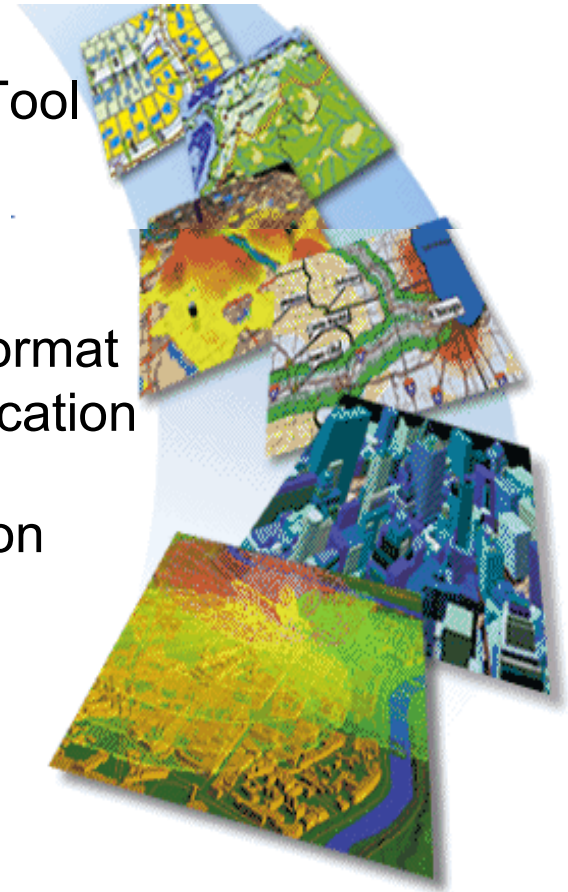




SSC ENVIRONMENTAL GIS APPLICATIONS

Stennis Space Center

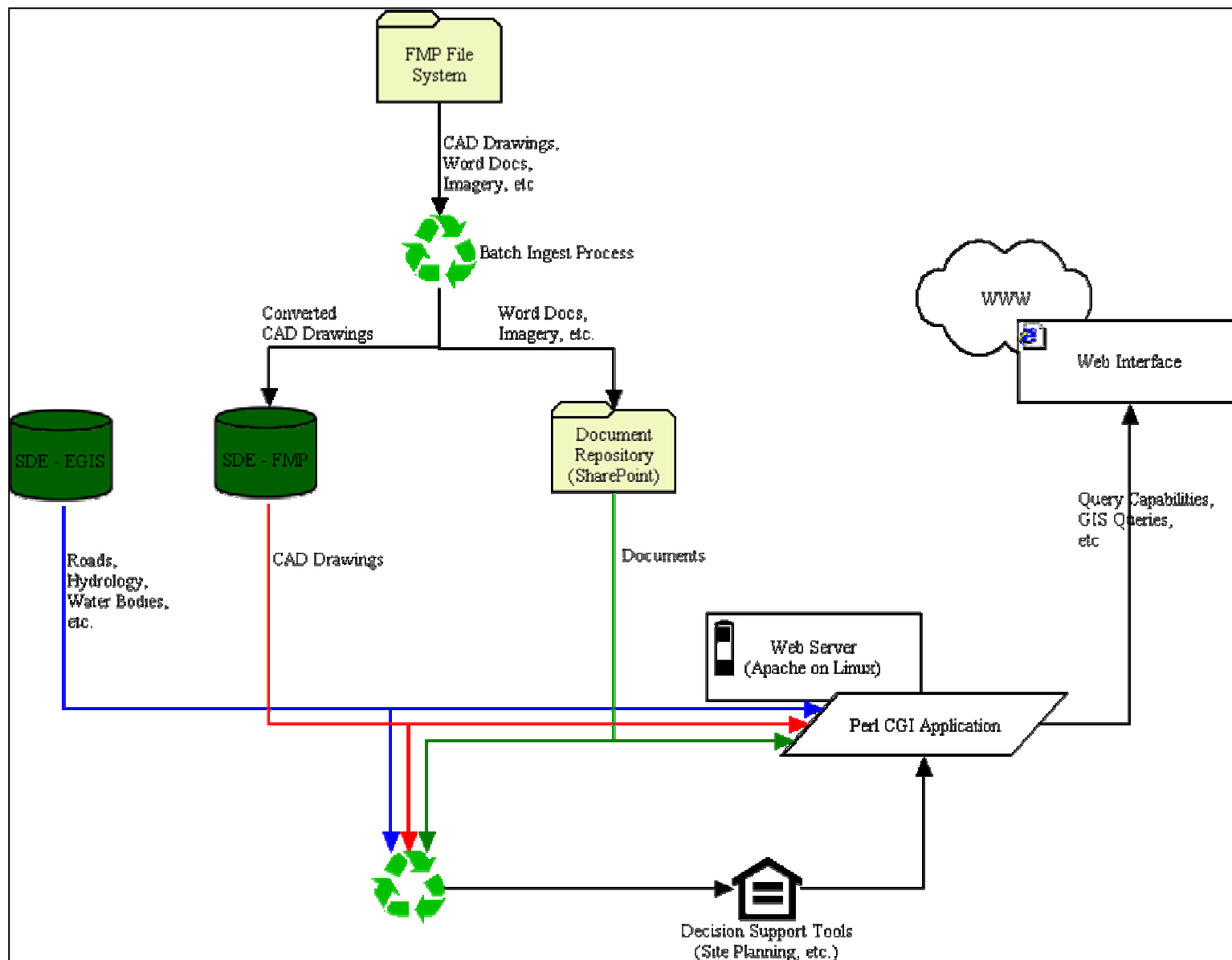
- Emergency Response/Disaster Preparedness
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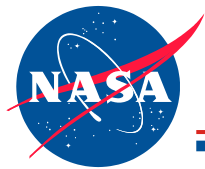




FMP PROJECT FLOW DIAGRAM

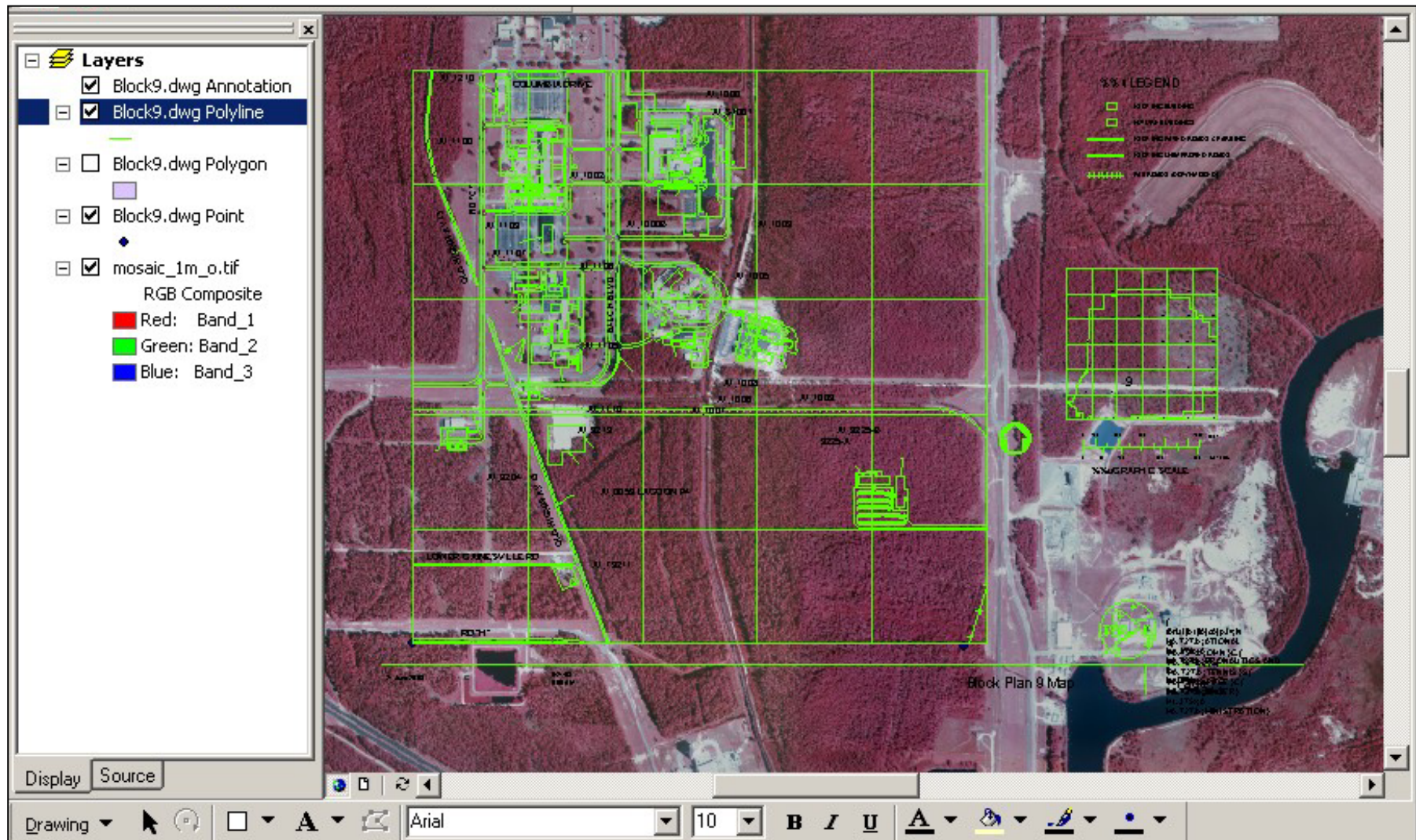
Stennis Space Center

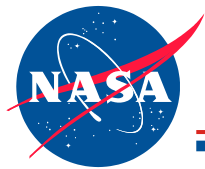




CAD/GIS INTEGRATION in ArcGIS

Stennis Space Center

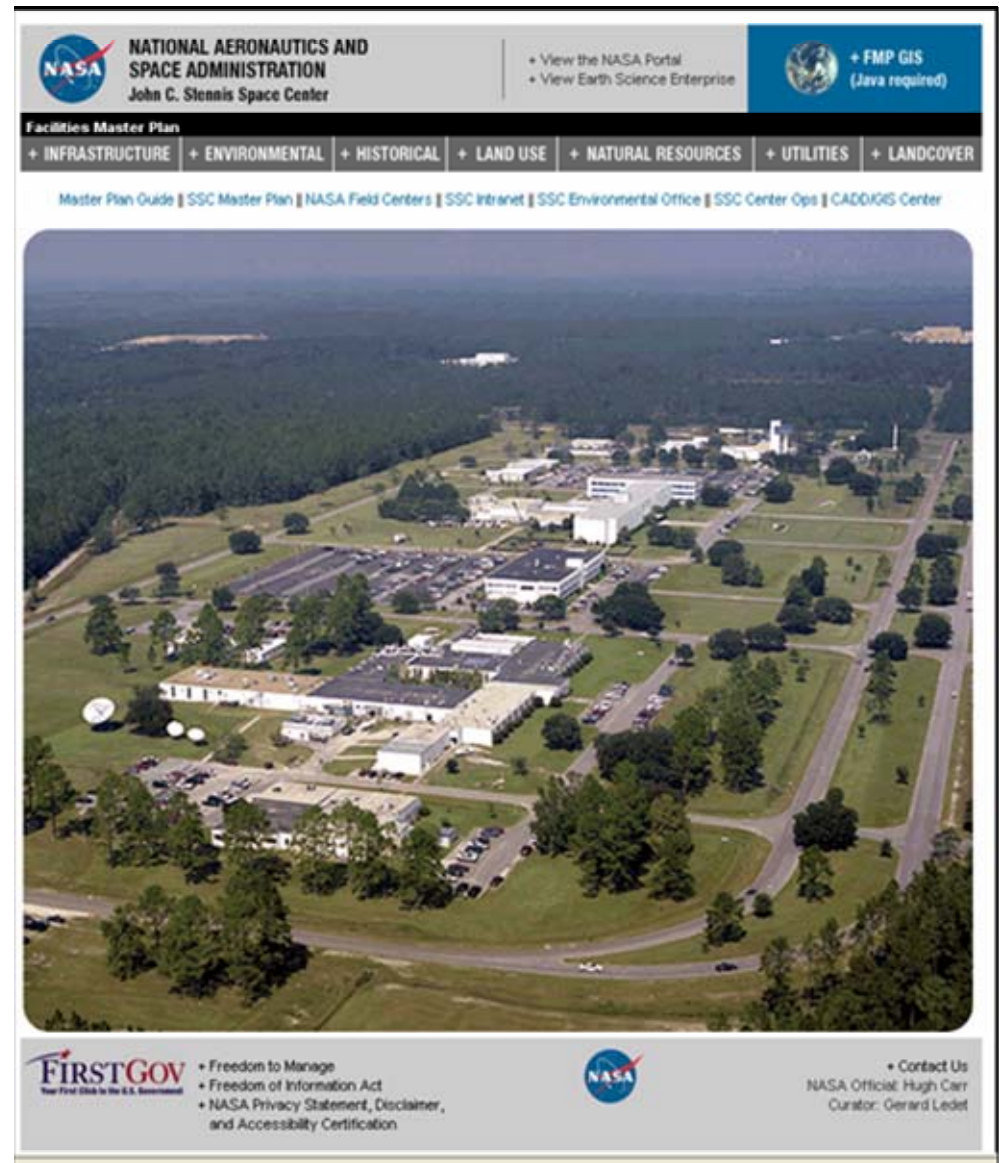




FACILITIES MASTER PLAN (FMP) WEB PORTAL

Stennis Space Center

- Pilot project to design, develop, and implement a web-based SSC FMP GIS application
- Aligns with NASA's Master Planning NPG 8820.2A
- Integrates narratives, databases, maps, and spatial query tools
- Provides true planning tool
- Linked to CADD database
- Initiated web-based – available site-wide

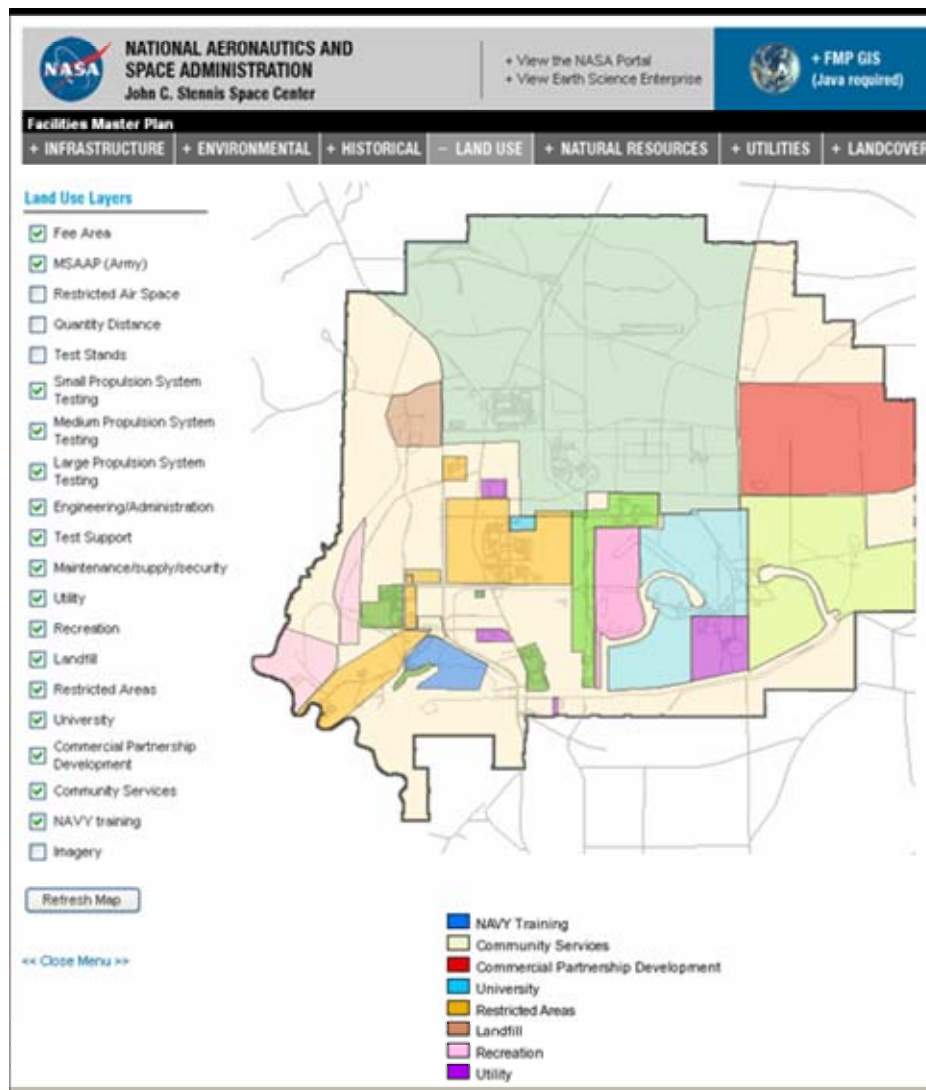


[illegible]



LAND USE

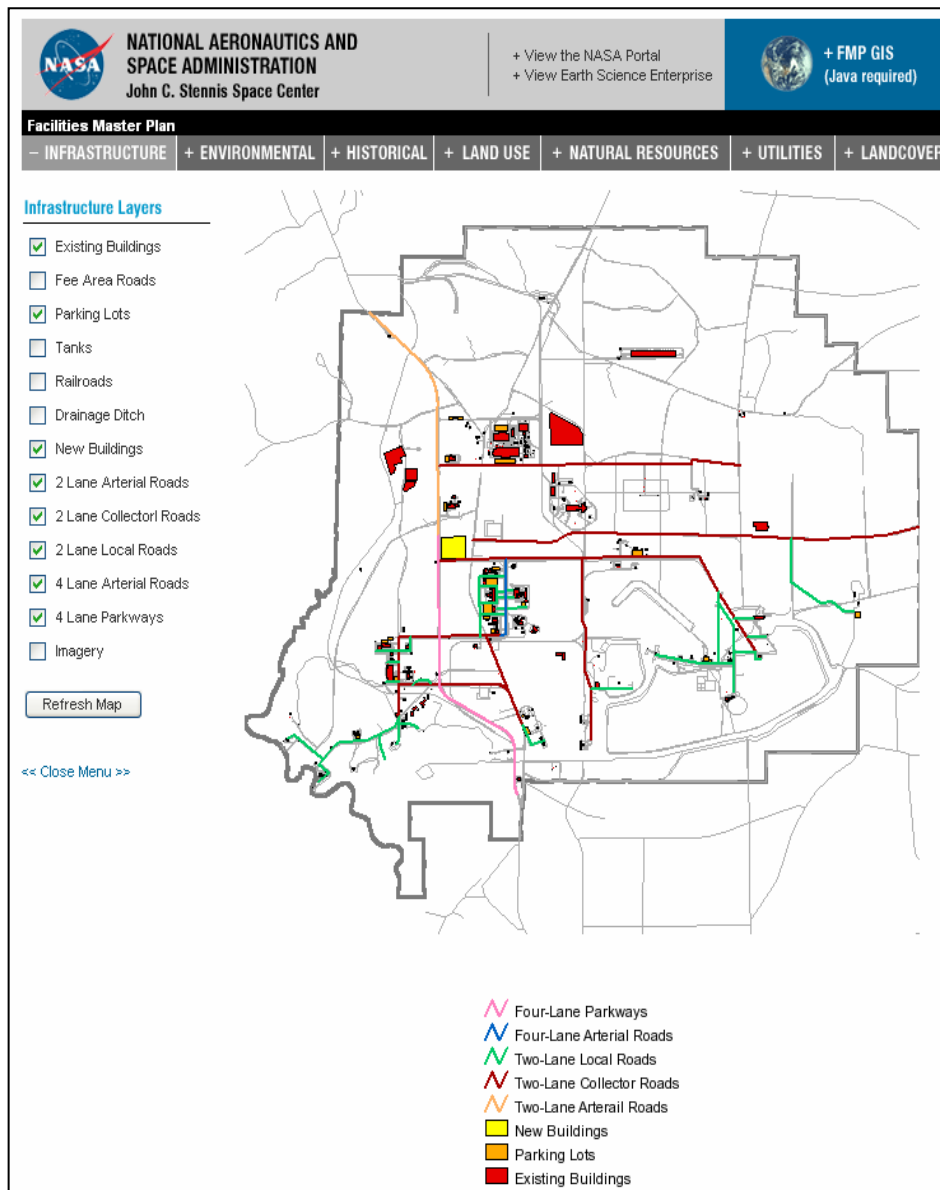
Stennis Space Center





INFRASTRUCTURE

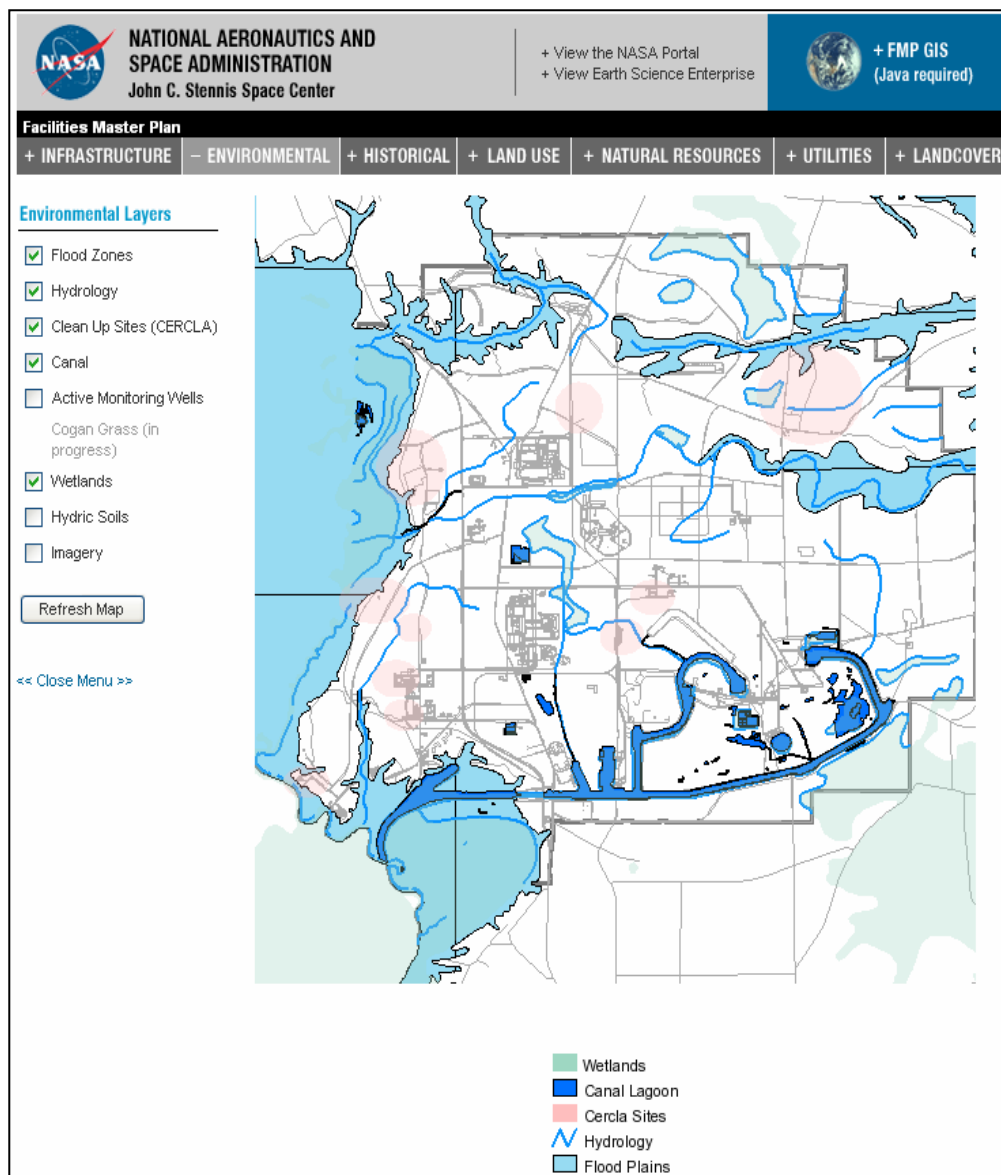
Stennis Space Center





ENVIRONMENTAL

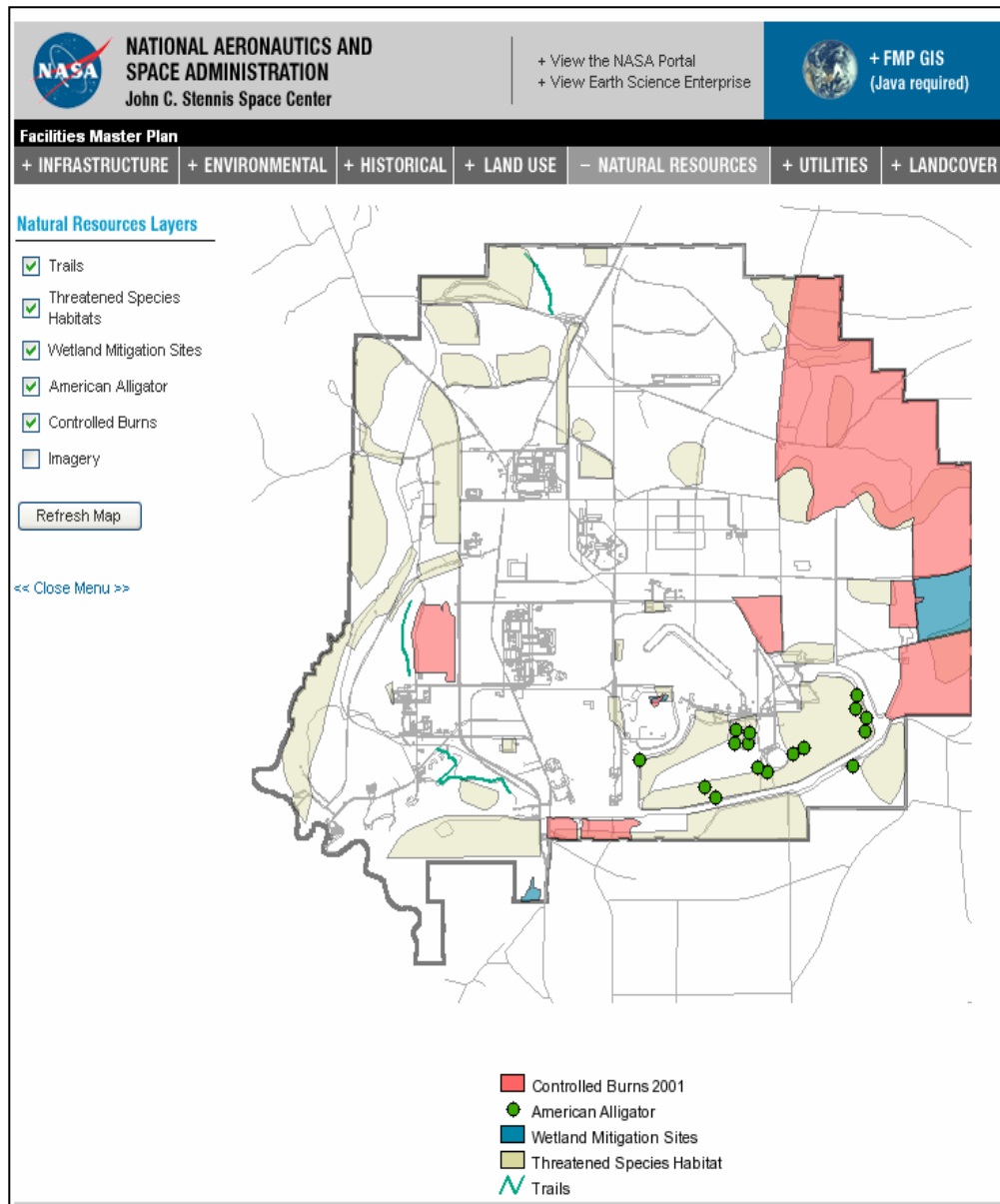
Stennis Space Center





NATURAL RESOURCES

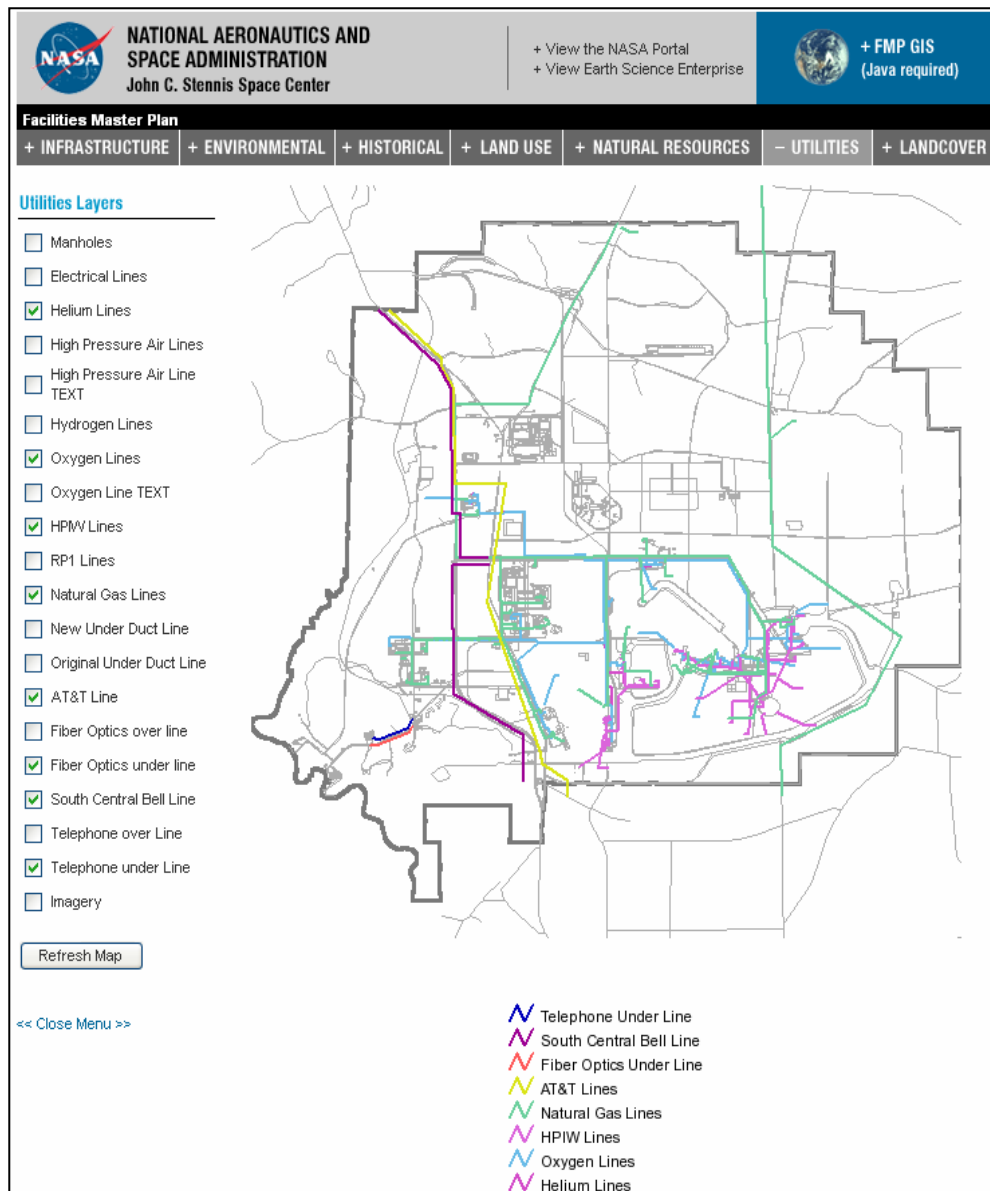
Stennis Space Center

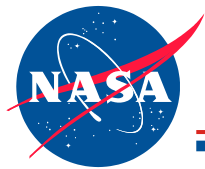




UTILITIES

Stennis Space Center





FMP FLOORPLAN DATA RETRIEVAL

Stennis Space Center

Orion View Layers Data Help

Space Type
Department
Potential Occupancy
Potential Conversion
Head Count
Vacant

Calculates how many rooms are occupied by a specific department/program

Department

- ☒ 3630 Development Eng (1 Rooms, 183 Square Feet)
- ☒ 3750 Analytical Sciences (16 Rooms, 2,019 Square Feet)
- ☒ 7350 Site Maintenance (3 Rooms, 464 Square Feet)
- ☒ 8020 External Mfg (6 Rooms, 803 Square Feet)

Generates room statistics including occupant name, phone, email, number of square feet occupied, manager

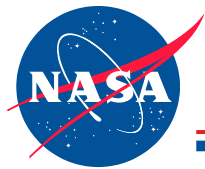
Room Statistics

Building M12, Room 3040B, Campus Mountain View

Division	1300 Legal & CAO	Space Type	Open Office
Area VP	Harold Smith	Executive Gross SF	100
Area Name	7300 Facilities X	Net SF	80
Area Number	7390	Max Occupancy	1
Area Manager	Mary Clare Smith	Current Occupancy	1

Occupant Information

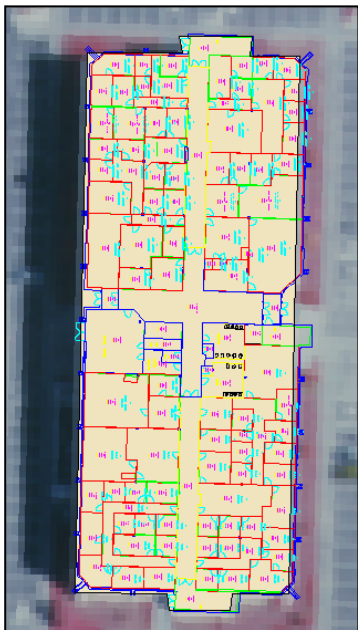
3D rendering of the building interior.



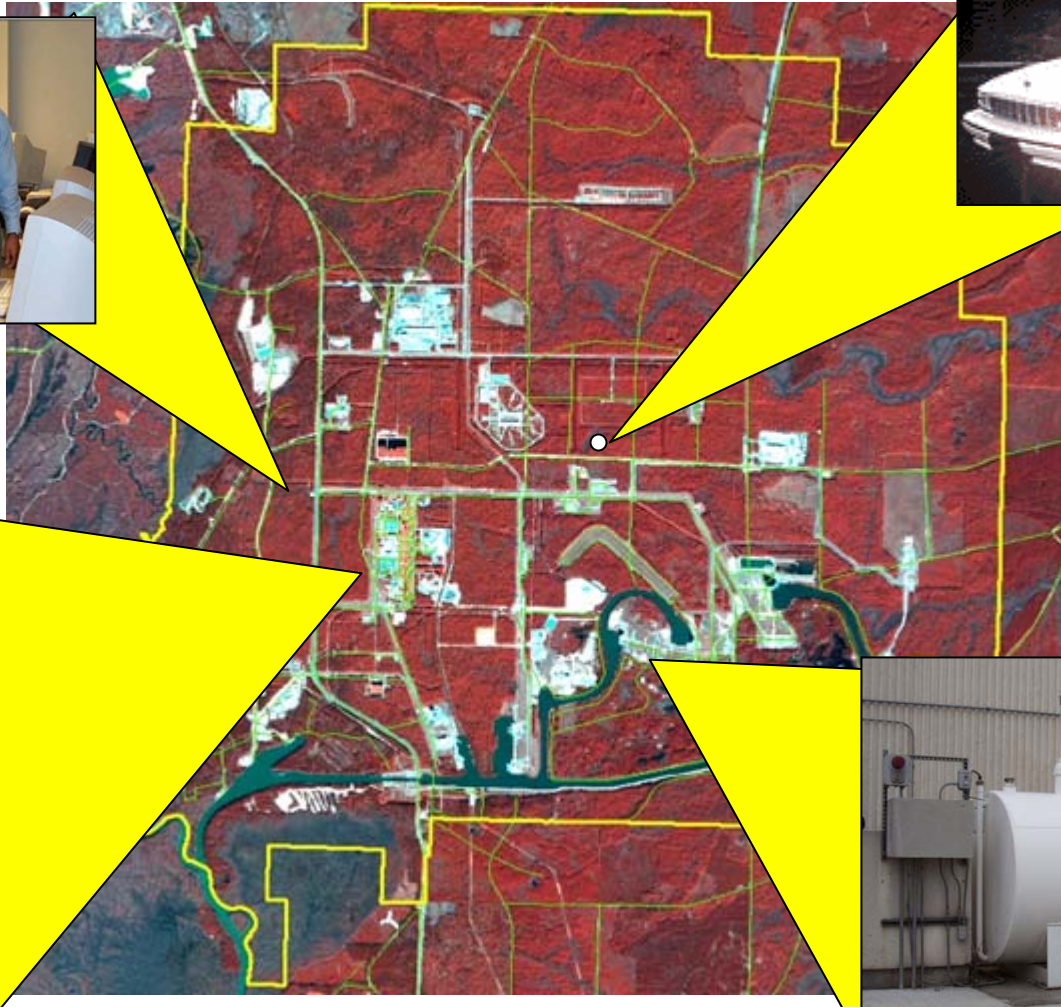
FUTURE SECURITY GIS CAPABILITIES

Stennis Space Center

E-911 Computer Aided Dispatch



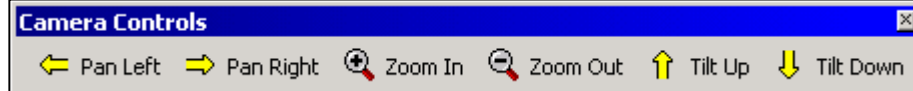
Emergency Floorplan Analysis Tool

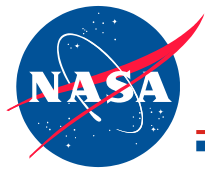


Security Patrol Car #3:

Sgt. John Doe
Lat: -89.57
Lon: 30.39
1400 hrs
12-04-04

Live CCTV Cameras

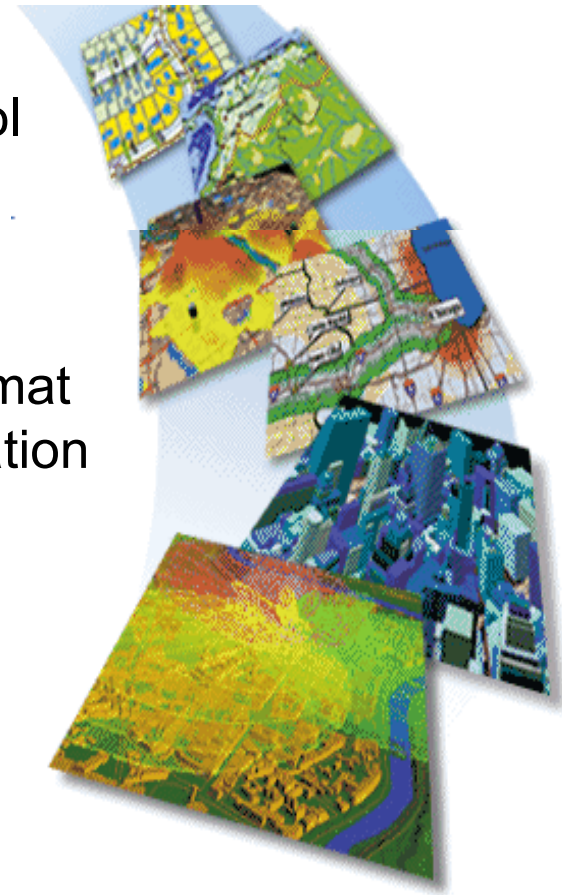


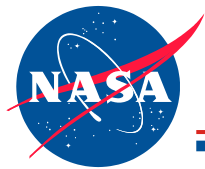


SSC ENVIRONMENTAL GIS APPLICATIONS

Stennis Space Center

- Emergency Response/Disaster Preparedness
 - Emergency Environmental Response Tool (EERT)
- Facilities Management and Master Planning
 - Conversion of CADD data to GIS format
 - Development of a web-based application
- Groundwater Monitoring and Chemical Remediation
 - CERCLA
- Resource Management and Site Assessment





CERCLA INTRODUCTION

Stennis Space Center

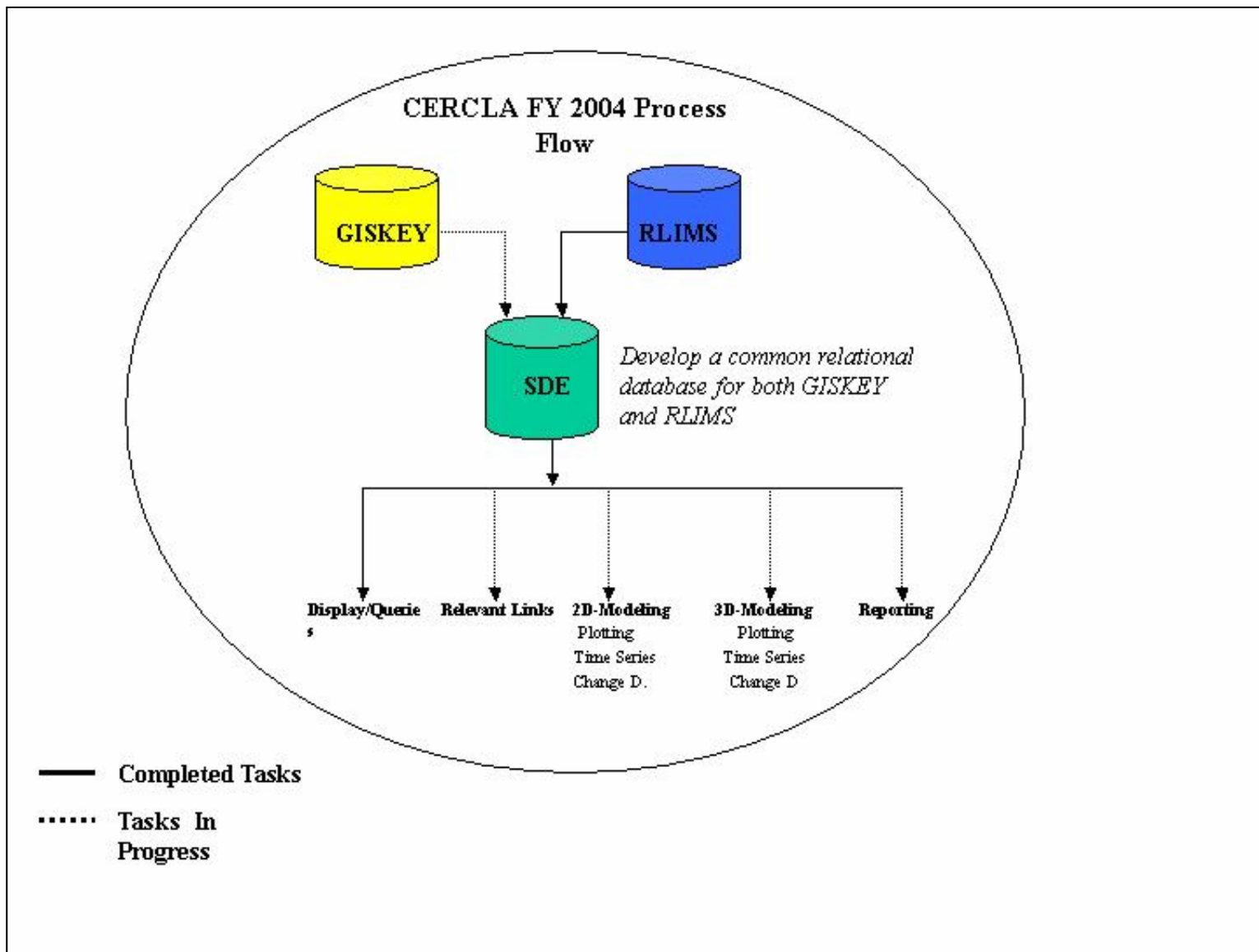


- **As part of the historic operations at SSC, various contaminants have been disposed and released**
- **SSC began a site identification and investigation process in 1990, and have designated 9 sites as clean-up areas**
- **The Relational Laboratory Information Management System (RLIMS) is the repository for current and future chemical data**



CERCLA PROJECT FLOW

Stennis Space Center





CLEANUP SITES

Stennis Space Center

Area A



Area A

Air Force Disposal Site Pesticide Operations Area

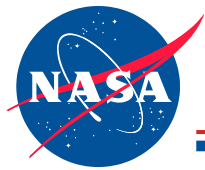
When: 1970s - 1990s

Where: Western boundary of SSC near Buildings 2501 and 2502

What: Contaminated debris and pesticide operation waste

Contaminants: Organic compounds, dioxin, pesticides/herbicides, and metals

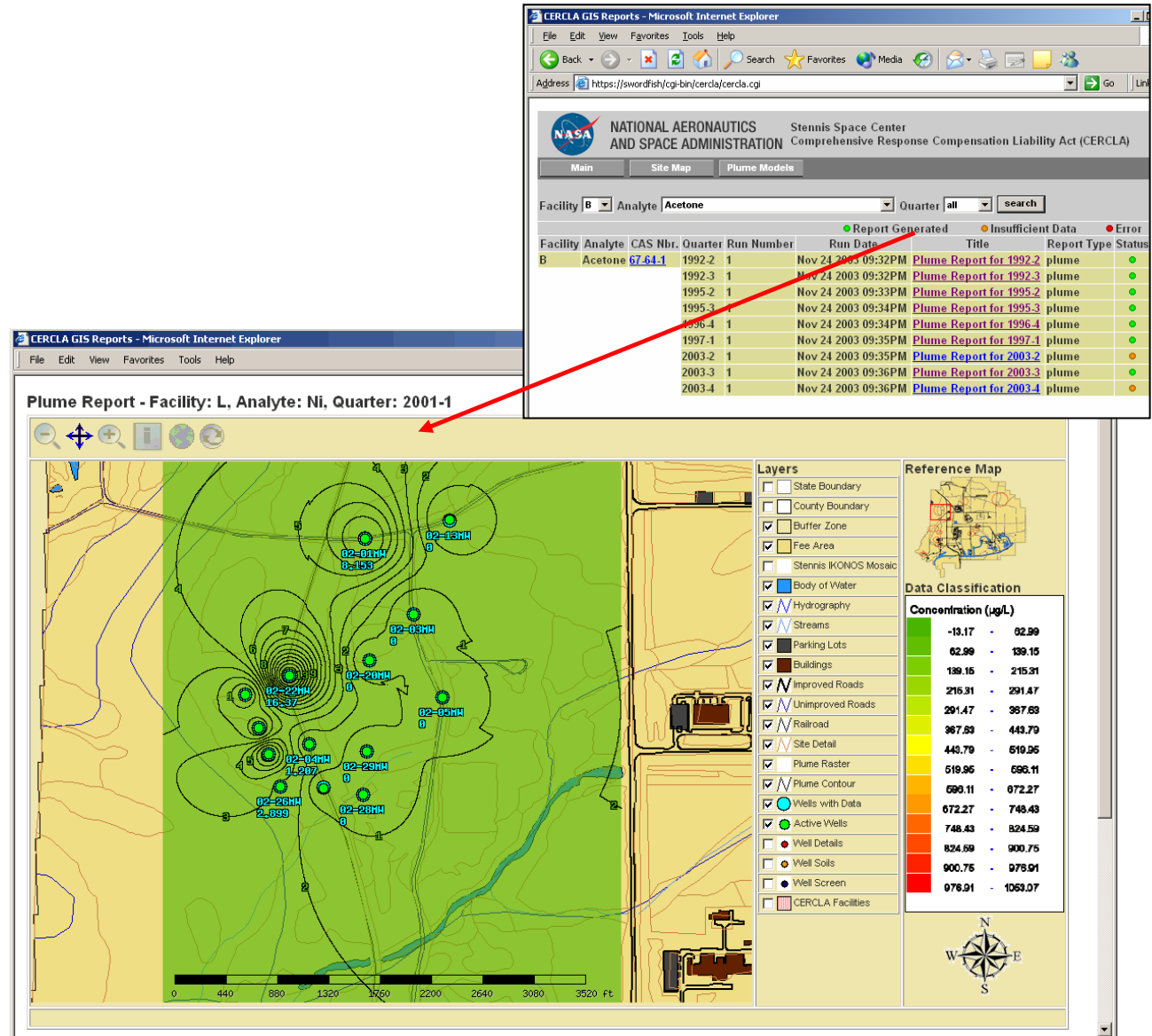
Status: Comment period closed and Decision Document signed. Installation of slurry wall and RCRA cap began in Spring 2001. Installation of passive treatment wall to begin in Fall 2001.



CERCLA GIS WEB PORTAL

Stennis Space Center

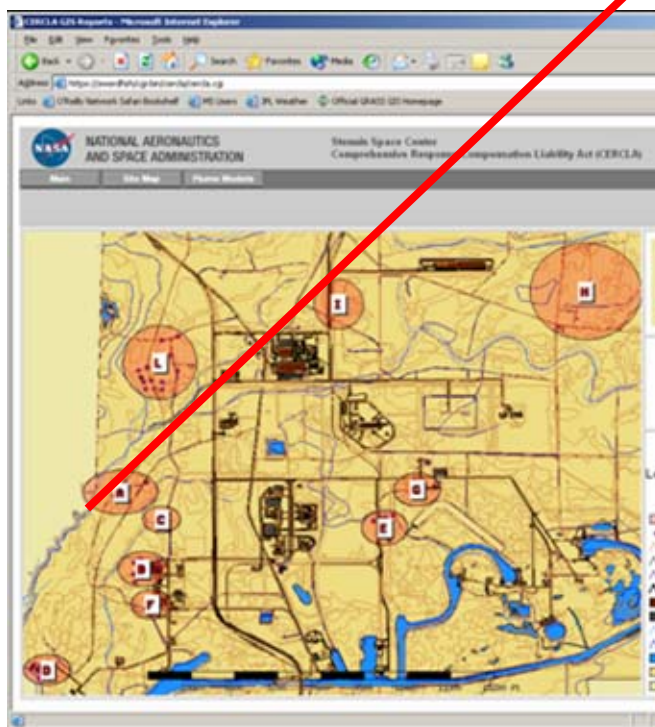
- Immediate access to SSC's clean up sites via Internet
- Facilitates reporting, compliance, site-assessment
- Dynamic 2-D maps, quarterly reports, analytical spreadsheets, site photos, EPA substance registry list, etc.
- Flexible, cost-effective
- 30+ year archival





LINK TO SSC ENVIRONMENTAL WEB

Stennis Space Center



SSC's Environmental Assurance Program - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Address http://www.ssc.nasa.gov/environmental/cleanup/area_d/area_d.html Go

Links O'Reilly Network Safari Bookshelf MS Users JPL Weather Official GRASS GIS Homepage

John C. Stennis Space Center
Environmental Assurance Program

ISO 14001
FAQs
Documents/Forms
Public Notices

Organization Environmental Management Resource Management Waste Management **Clean Up** Chemical/Fuel Control Weather

Clean Up Area A Area B Area C **Area D** Area E Area F Area G Area H Area I



Area D
Recreational Disposal Area
When: 1960s -1970s
Where: Southwestern portion of SSC near Building 2411
What: Used chemicals discharged into limestone pits for treatment
Contaminants: Organic compounds and pesticides
Status: Comment period closed and Decision Document signed. Soil removals completed. Depression at bottom of hillside was excavated, backfilled with clean fill, graded, and seeded. Installation of groundwater pump and treatment system began in Summer 2001.

Site Design by
Stennis Multimedia Services

Curator - David Walters
Responsible NASA Official - Anne Peek



LINK TO EPA

Stennis Space Center

CERCLA GIS Reports - Microsoft Internet Explorer

Address: <https://swordfish/cg-bn/cercla/cerda.cgi>

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
Stennis Space Center
Comprehensive Response Compensation Liability Act (CERCLA)

Facility: B Analyte: Acetone Quarter: all search

Facility	Analyte	CAS Nbr.	Quarter	Run Number	Run Date	Report Generated	Insufficient Data	Error	Title	Report Type	Status
B	Acetone	67-64-1	1992-2	1	Nov 24 2003 09:32PM	Plume Report for 1992-2			plume		
			1992-3	1	Nov 24 2003 09:32PM	Plume Report for 1992-3			plume		
			1995-2	1	Nov 24 2003 09:33PM	Plume Report for 1995-2			plume		
			1995-3	1	Nov 24 2003 09:34PM	Plume Report for 1995-3			plume		
			1996-4	1	Nov 24 2003 09:34PM	Plume Report for 1996-4			plume		
			1997-1	1	Nov 24 2003 09:35PM	Plume Report for 1997-1			plume		
			2003-2	1	Nov 24 2003 09:35PM	Plume Report for 2003-2			plume		
			2003-3	1	Nov 24 2003 09:36PM	Plume Report for 2003-3			plume		
			2003-4	1	Nov 24 2003 09:36PM	Plume Report for 2003-4			plume		

EPA Substance - Microsoft Internet Explorer

Address: http://oaspub.epa.gov/srs/srs_proc_gry.navigate?P_SUB_ID=4309

U.S. Environmental Protection Agency
Substance Registry System

Recent Additions | Contact Us
EPA Home > SRS > Search > Substance

Other Numbers | Synonyms | Regulatory Resources | Other Sources | Group/Component | Related Links | Download

Acetone

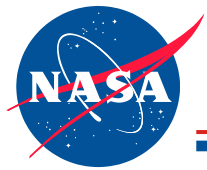
EPA Source Name: [ChemIDPlus](#)
Systematic Name: 2-Propanone
Systematic Source Name: [CAS 90](#)
CAS Number: 67-64-1
Classification: Chemical
Molecular Formula: C3H6O
Molecular Weight: 58.08

Other Numbers

None

Synonyms

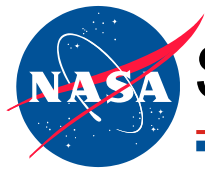
Name
2-Propanone
Acetone
Methyl ketone



3-D VISUALIZATION

Stennis Space Center

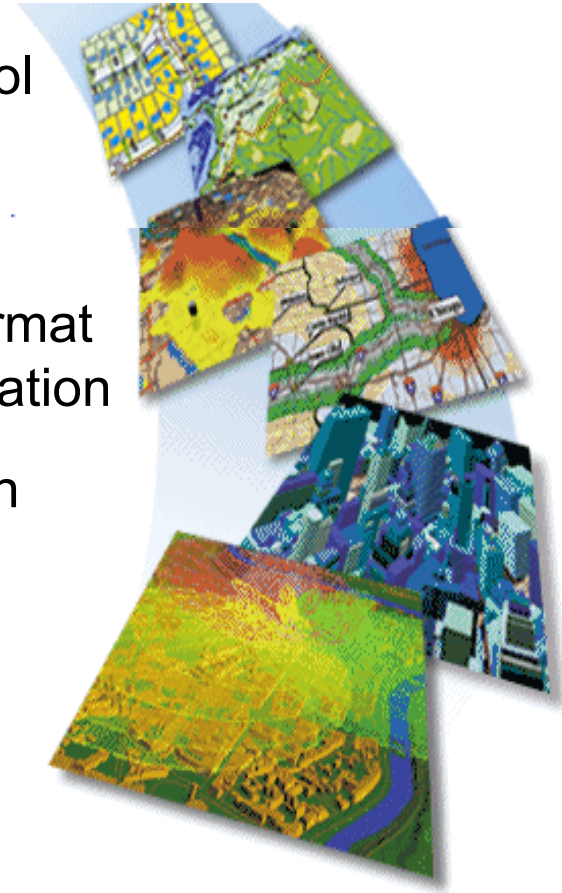


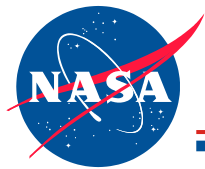


SSC ENVIRONMENTAL GIS APPLICATIONS

Stennis Space Center

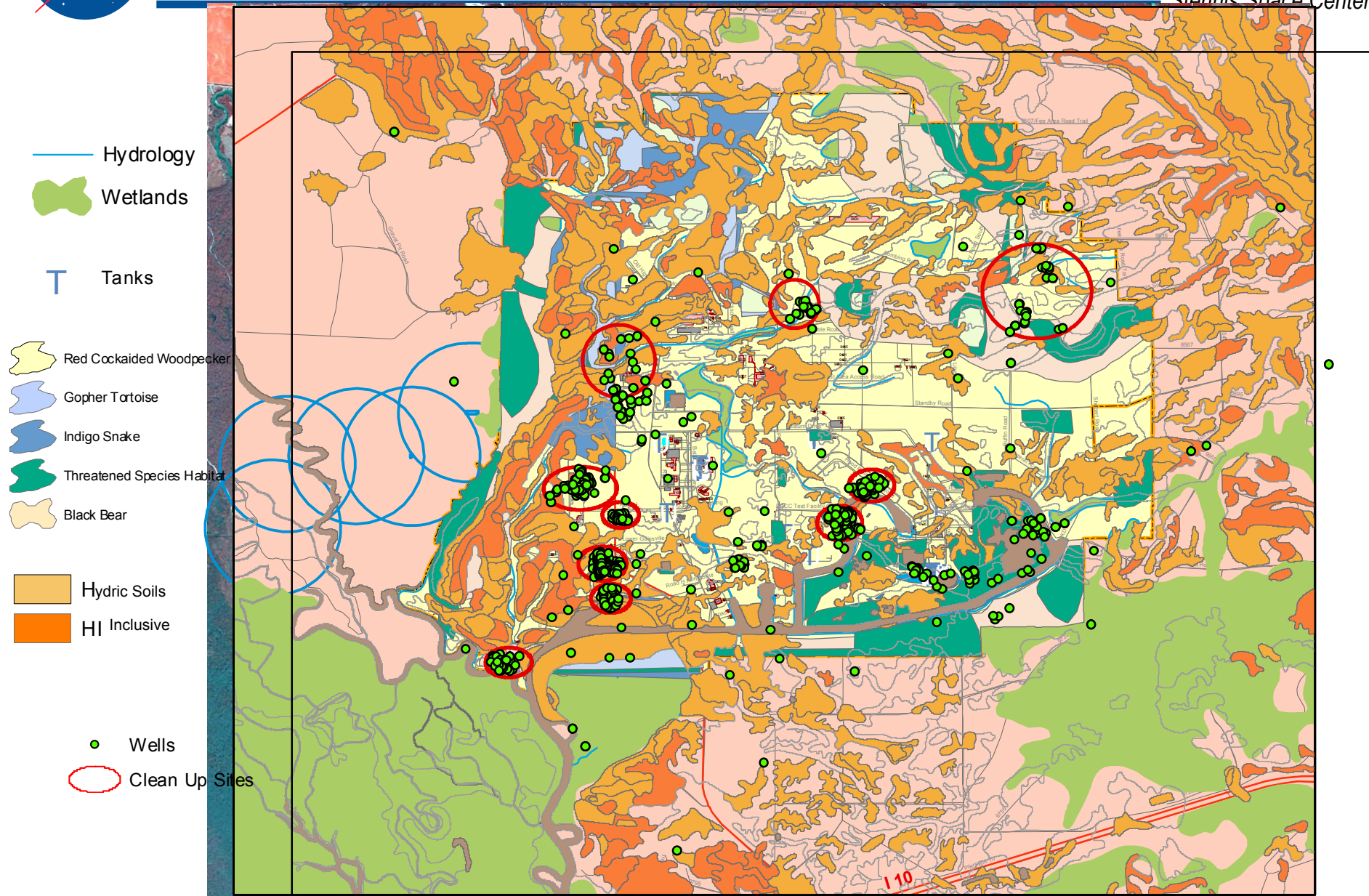
- Emergency Response/Disaster Preparedness
 - Emergency Environmental Response Tool (EERT)
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 - Conversion of CADD data to GIS format
 - Development of a web-based application
- Groundwater Monitoring and Chemical Remediation
 - CERCLA
- Resource Management and Site Assessment

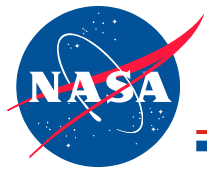




SSC EGIS

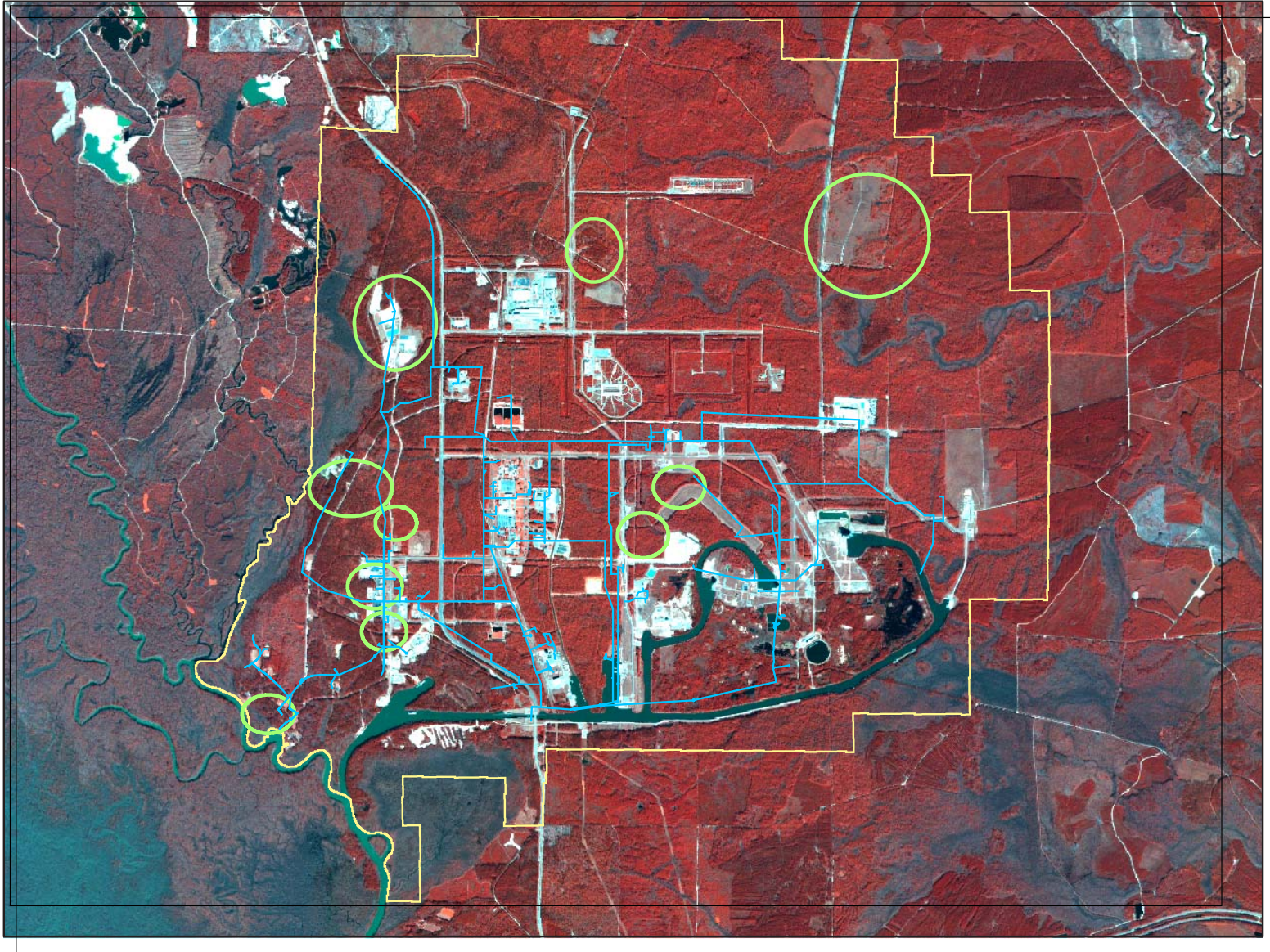
Stennis Space Center

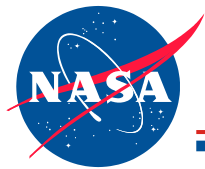




SITE ASSESSMENT

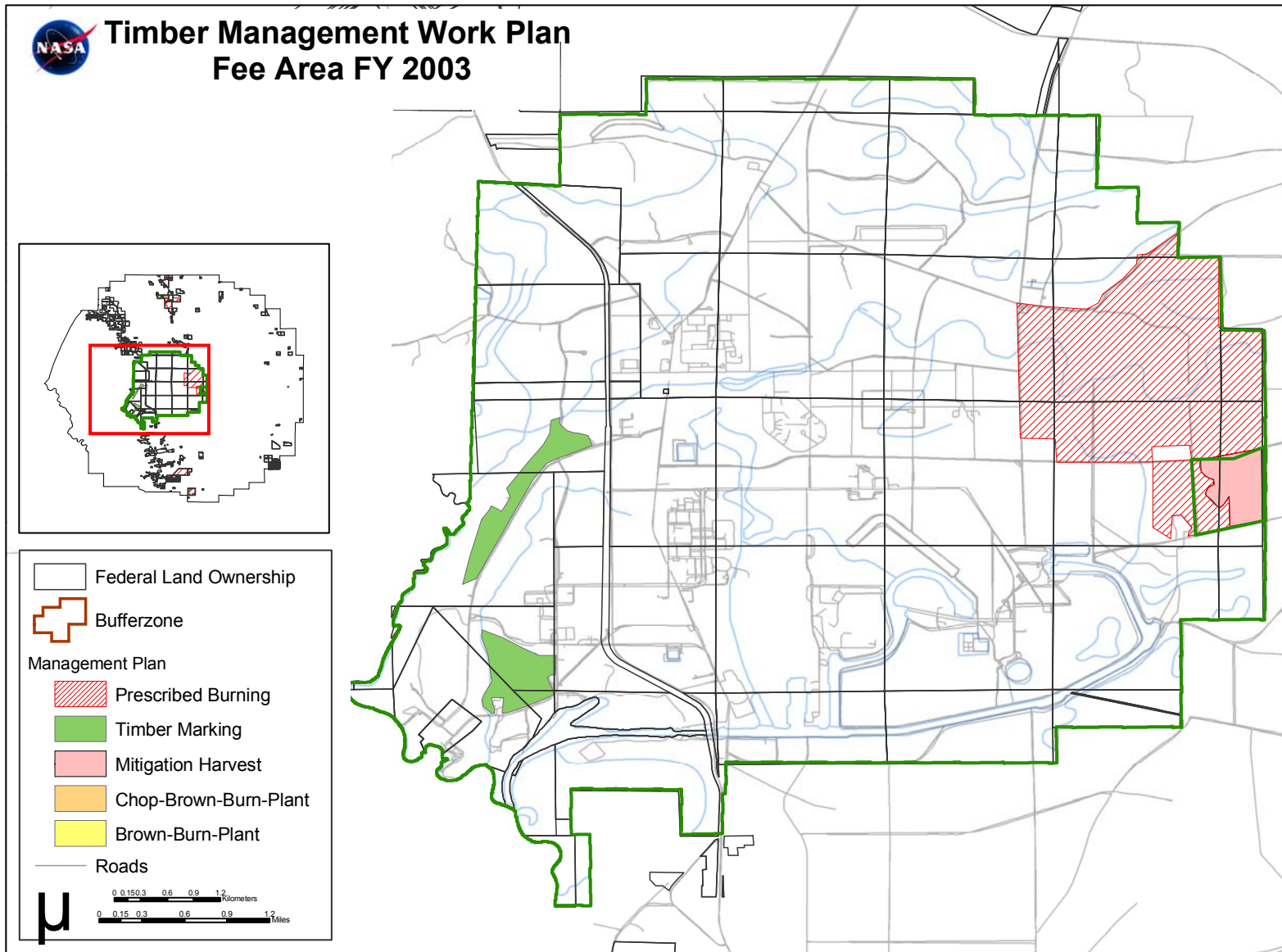
Stennis Space Center

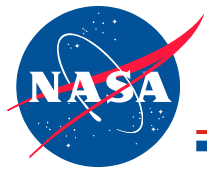




TIMBER MANAGEMENT

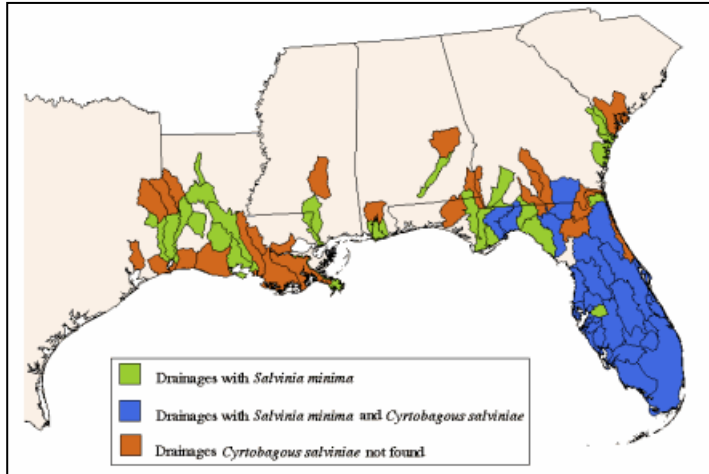
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INVASIVE SPECIES MONITORING

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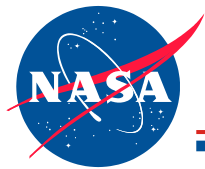


- Cogongrass has been designated as the seventh worst weed in the world, with over 1.2 billion acres infested worldwide



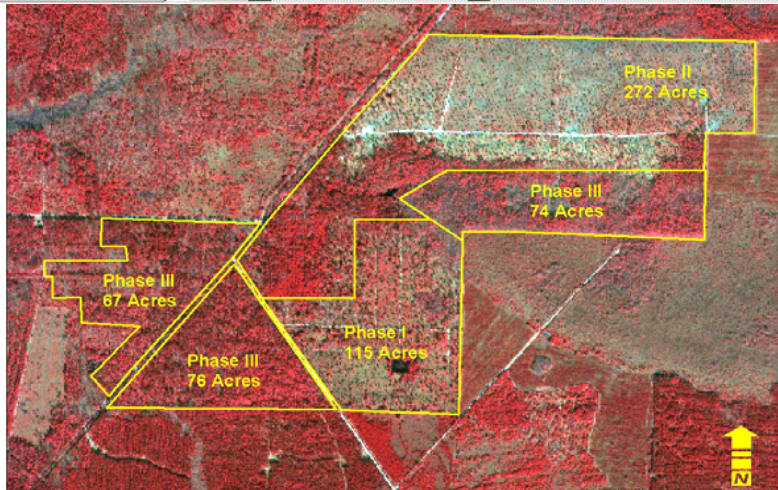
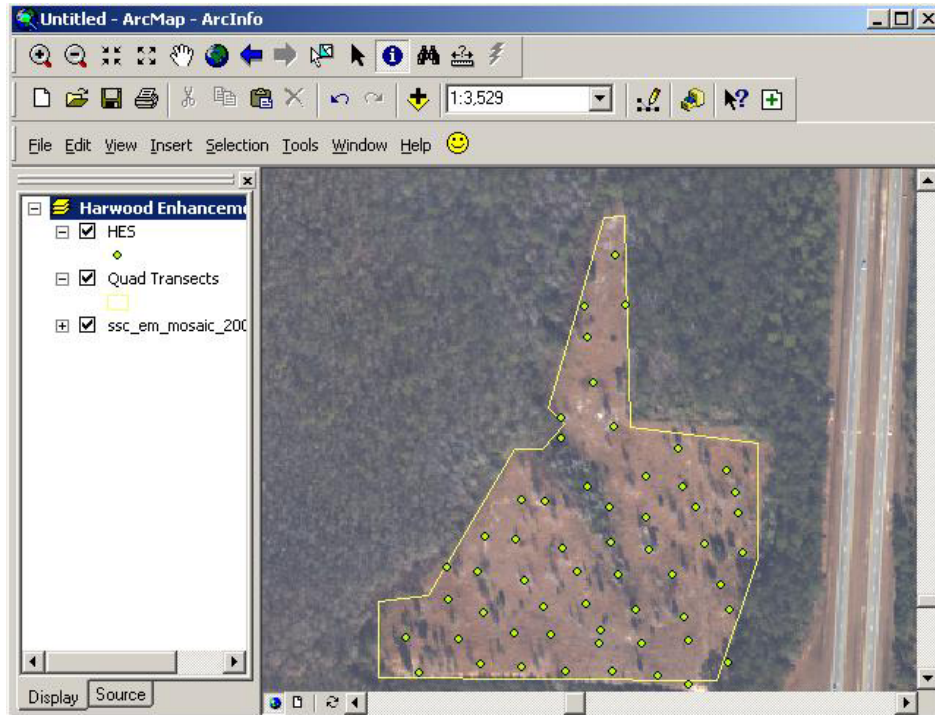
- *Salvinia Minima*

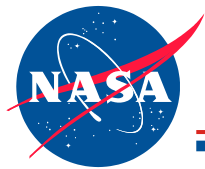




WETLAND MITIGATION SITES

Stennis Space Center

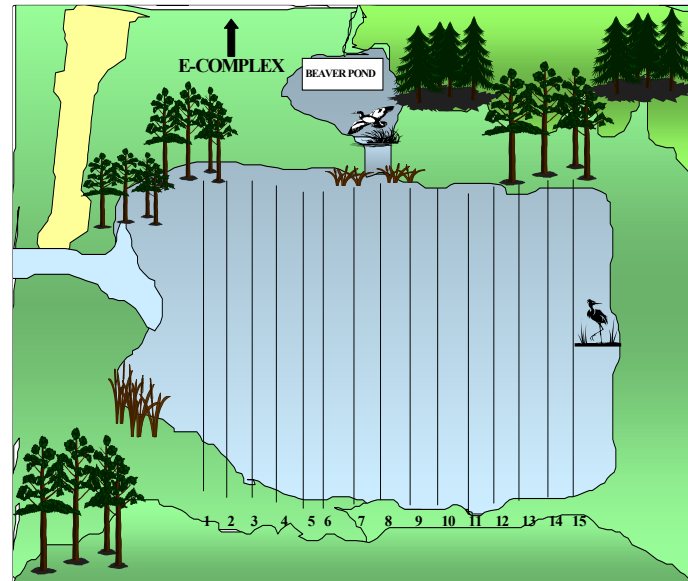
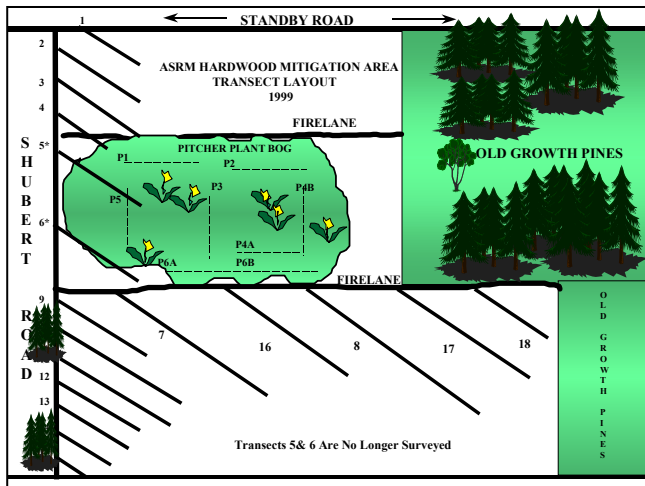




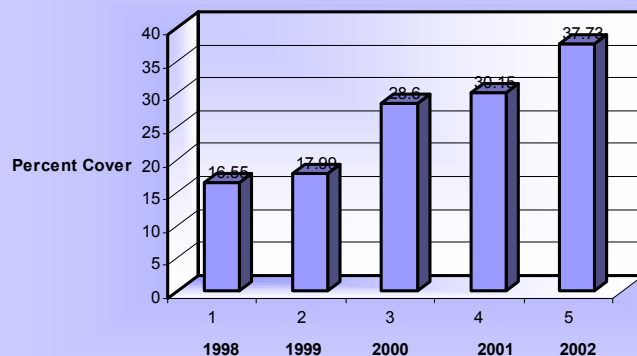
WETLANDS INVENTORY

Stennis Space Center

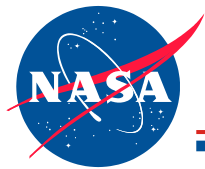
Data from wetlands mitigation sites are integrated into the EGIS to provide reports on species diversity, vegetative cover, wetland hydrology, and tree types.



Pitcher Plant Percent Coverage



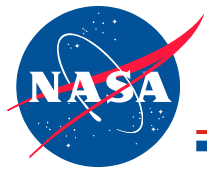
SPECIES	1994 Baseline	1996	1997	1998	1999	2000	2001
Bald Cypress	542	466	448	442	448	502	510
Water Tupelo	70	3	2	0	0	0	9
Pines	*	*	32	29	65	8	57
Total Stem Count	612	469	482	471	513	510	576



FLOODPLAINS

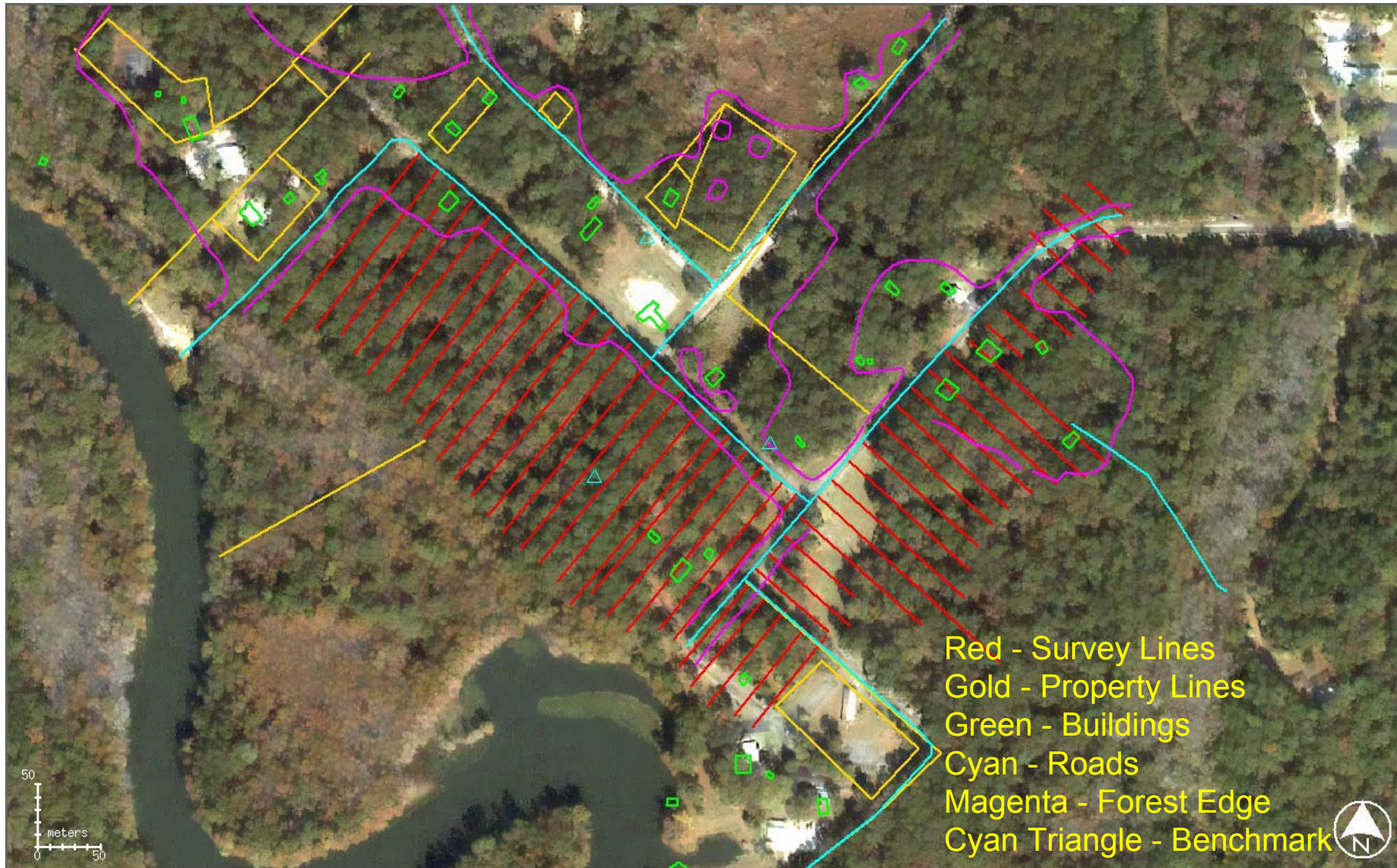
Stennis Space Center

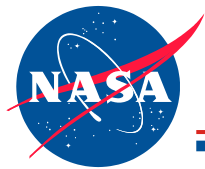




CULTURAL RESOURCE MANAGEMENT

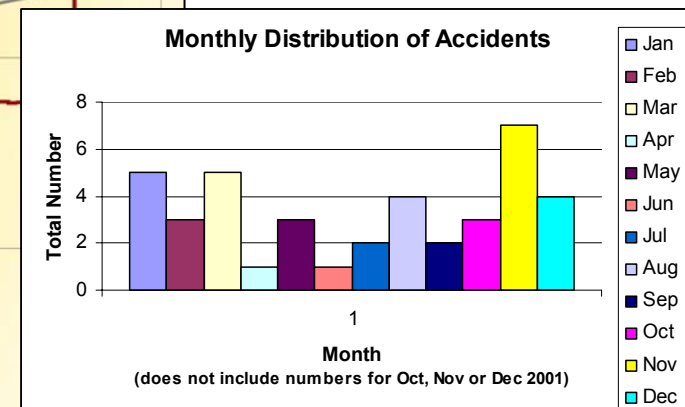
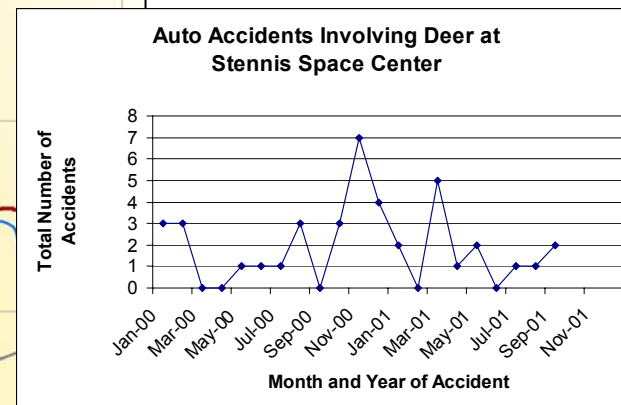
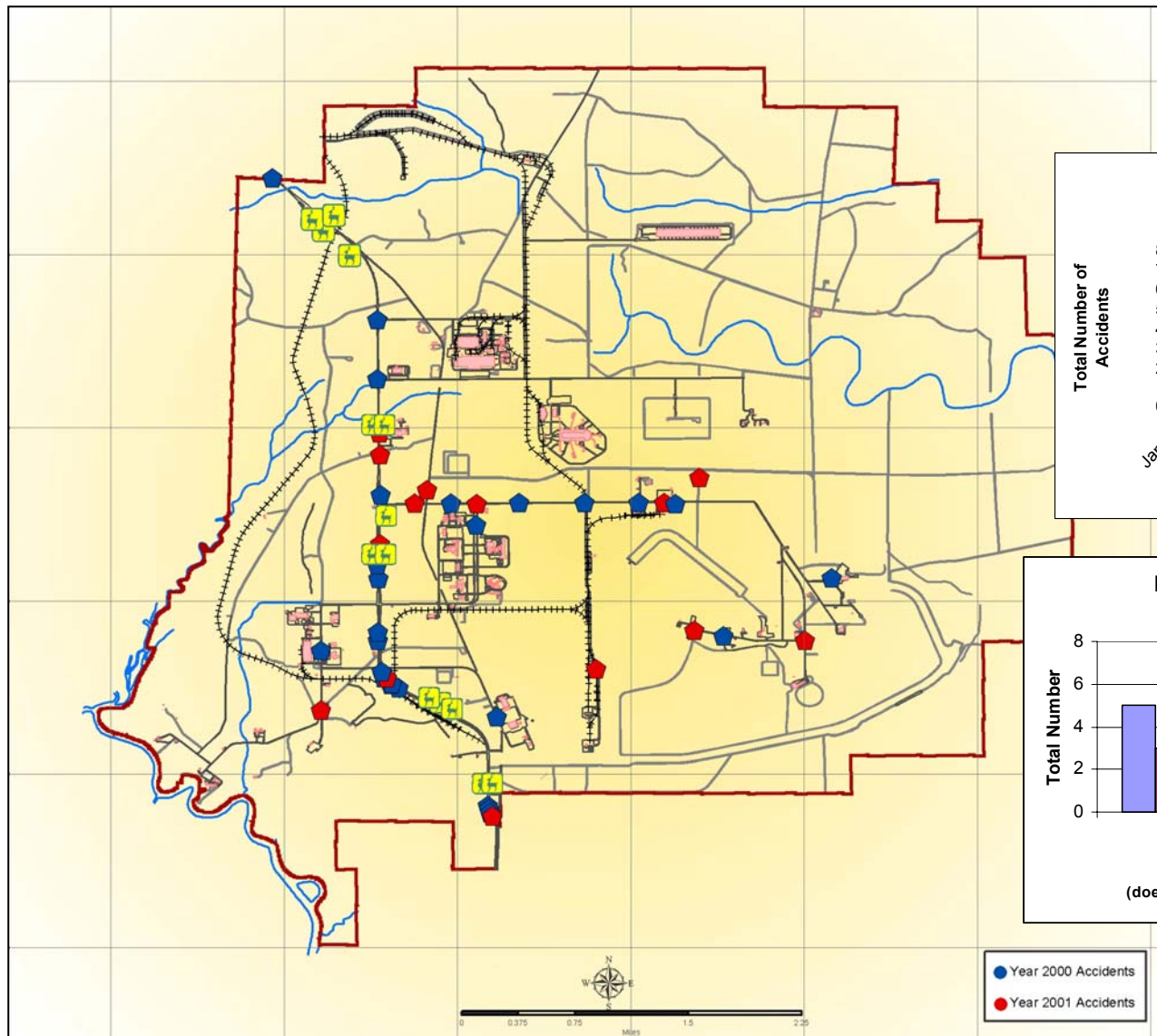
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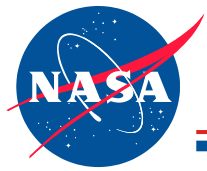




DEER AUTO ACCIDENTS

Stennis Space Center





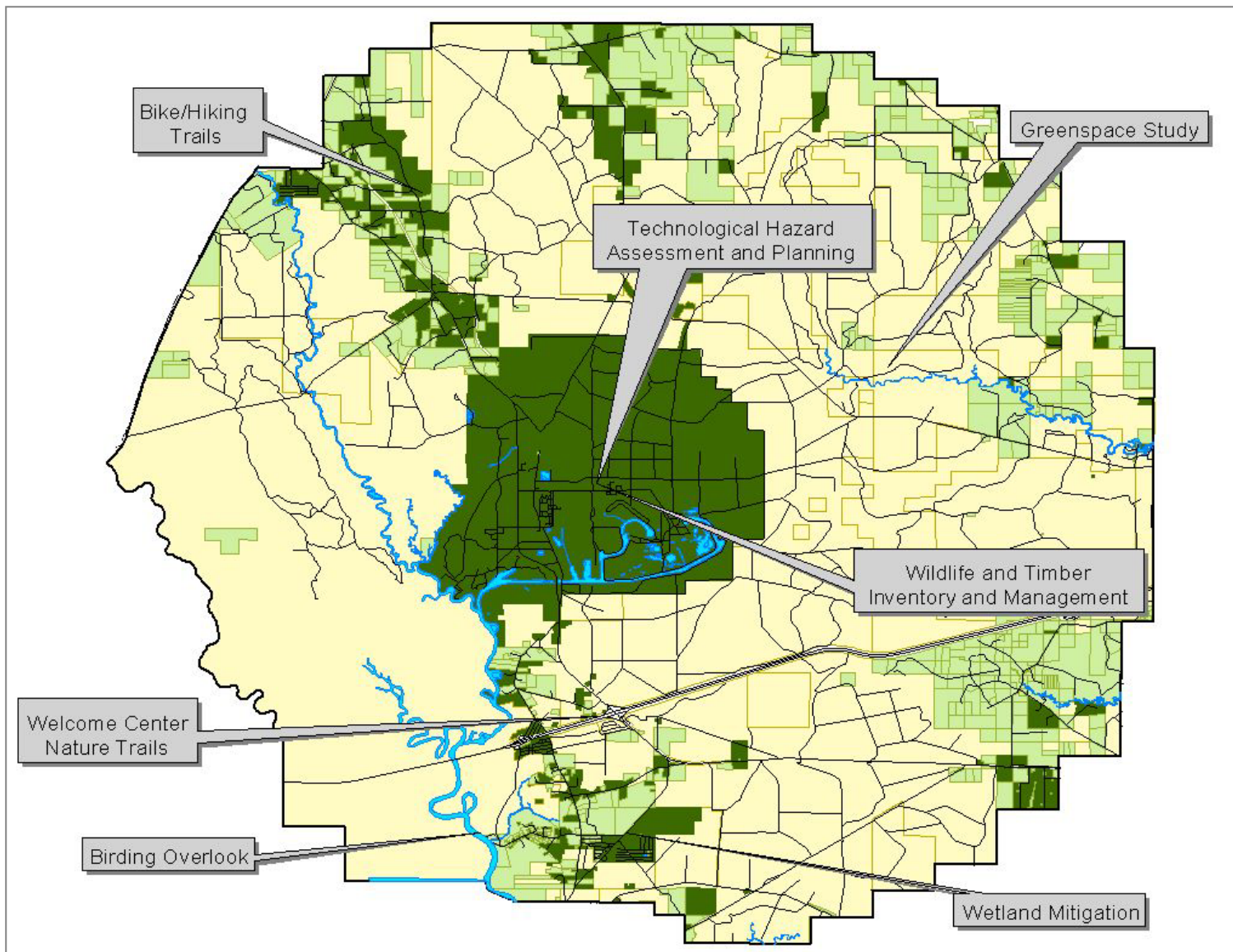
THREATENED SPECIES

Stennis Space Center



RECREATIONAL SITING

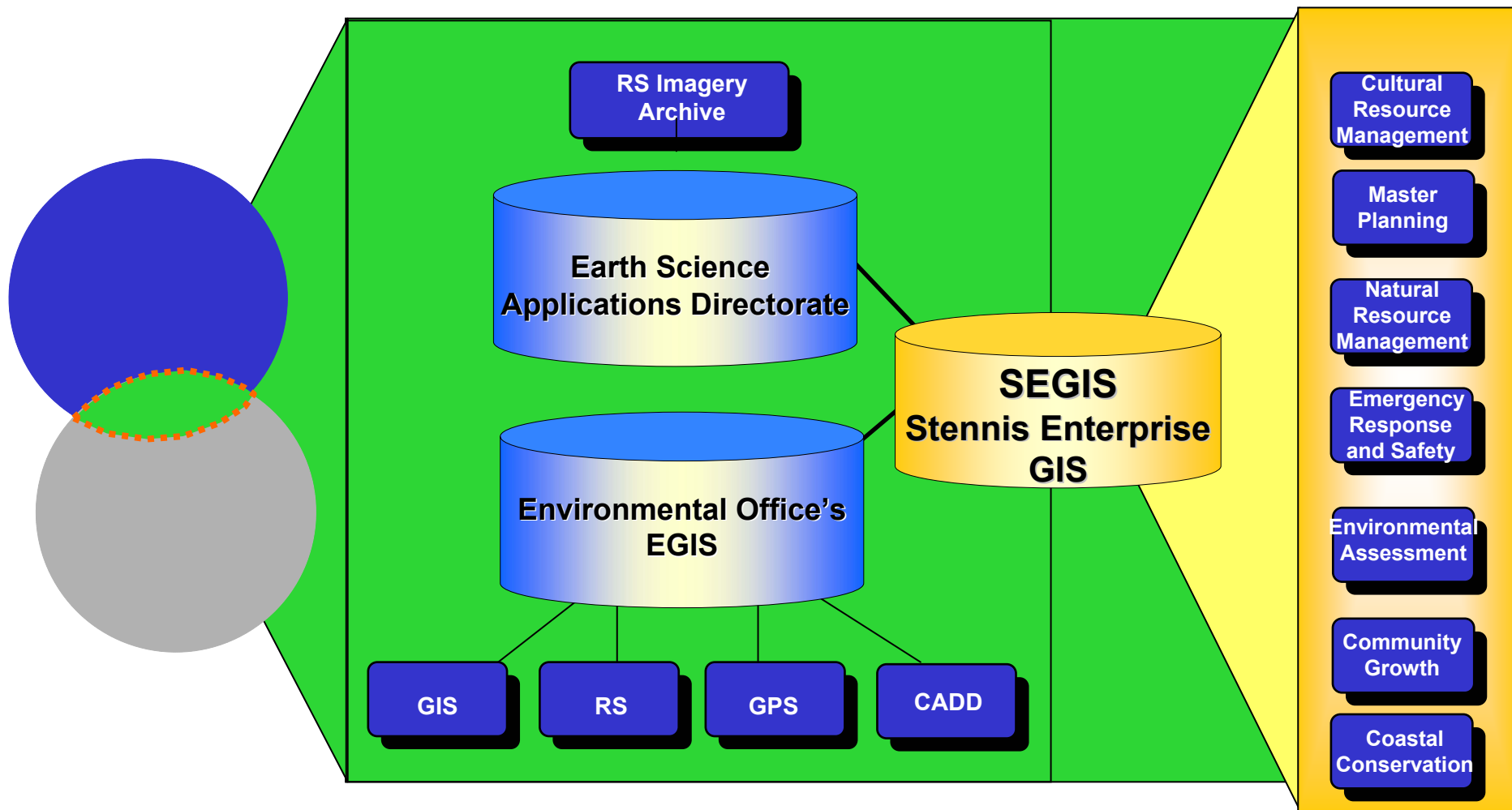
Stennis Space Center

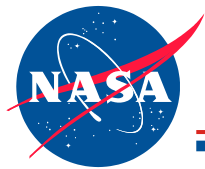




SSC ENTERPRISE GIS

Stennis Space Center





VISIONS

Stennis Space Center



- Continue to develop uniform datasets and applications that allow offices throughout NASA to work together more efficiently, thus improving overall coordination and collaboration

Leverage other programs to provide value to NASA's Environmental Management division and to the participating centers and major facilities

- Continue to design an SSC Enterprise-wide GIS for managing, maintaining, and sharing geographic data with applications in:
 - Homeland Security/Emergency Response
 - Resource Management
 - Facilities Master Planning
 - Environmental Site Assessment



Environmental Geographic Information Systems

Using GIS to Monitor Our Environment

The Environmental Office is responsible for compliance with all environmental requirements, pollution prevention, and sustainable practices for all NASA and resident agency activities. To aid in this task, the NASA SSC Environmental Office has initiated an Environmental Geographic Information System (EGIS) for the John C. Stennis Space Center. This database is comprised of eight core datasets including demographics, hydrology, cadastral, physiography, political boundaries, environmental, airborne/satellite imagery, and infrastructure.

In recent years, the SSC EGIS has emerged as a support tool for natural resource management, groundwater monitoring, emergency response, land cover assessment, facilities management, environmental assessment, wildlife tracking, and noise pollution modeling.

Benefits

GIS has become an integral part of environmental management. It integrates large volumes of spatial data from a variety of sources and provides planners, policy makers, and scientists, with the means to visualize and analyze environmental data to make better decisions. NASA has taken an active role in the utilization of this technology and is committed to community safety and protection of the environment.



NASA's Unique Capacity and Contributions

NASA has become a recognized leader in geospatial applications and environmental management in the scientific community. The Environmental Management Division enables environmentally sound mission success through four key areas: Prevention, Conservation, Compliance and Restoration.

NASA SSC Environmental Office is collaborating with other NASA field centers to promote GIS and improve the way we monitor and manage our environment and natural resources.



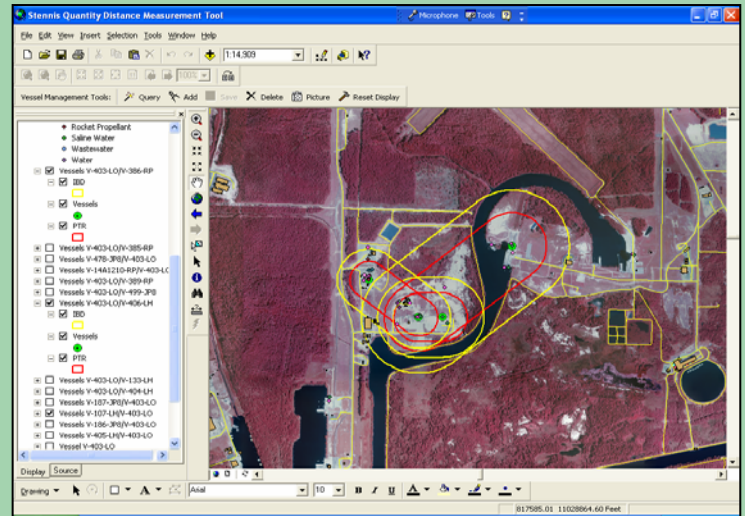
GIS for Disaster Response: Emergency Environmental Response Tool (EERT)

GIS in Action

Facility management and safety officers are responsible for ensuring the physical security of the facilities, staff, and equipment as well as for responding to environmental emergencies, such as accidental releases of hazardous materials. All phases of emergency management (planning, mitigation, preparedness, and response) depend on data reliability and system interoperability from a variety of sources to determine the scope of the event.

How Does the EERT Work?

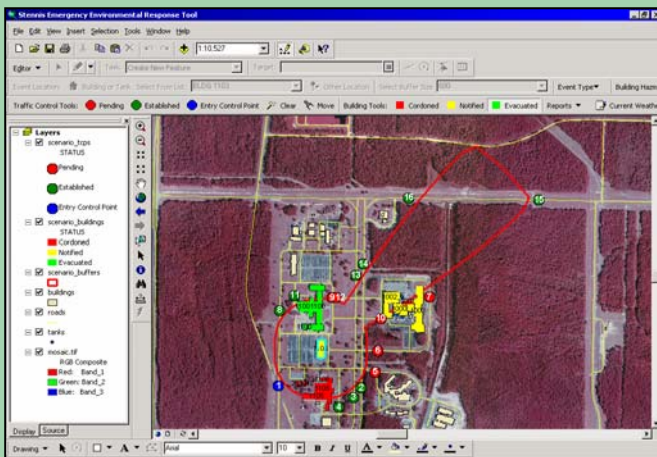
The EERT integrates and utilizes existing NASA environmental and facility information, including GIS vector layers, hazardous materials (HAZMAT) data, point-of-contact information, and satellite imagery. Furthermore, it incorporates real-time weather information and can model chemical release plumes from government validated and approved models, such as the Aerial Locations of Hazardous Atmosphere (ALOHA) model. The EERT allows emergency response teams to monitor traffic control points, to identify entry control point(s) into and out of a cordoned area, and to monitor evacuated buildings within the cordoned area.



EERT ArcGIS Interface

Decision Support Solutions

The EERT is a key geospatial component of NASA's Environmental Management System that uses both GIS and remote sensing technologies to support NASA's response and preparedness requirements. The primary advantages of using the new system include the ability to identify unique aspects of the event site, to identify specific locations of hazardous materials, to specify safety zones and their appropriate sizes, and to track the extent of dangerous plumes. This flexibility permits more efficient and effective use of resources, such as the placement of blockades, emergency response teams, and special equipment.



Chemical Event Scenario

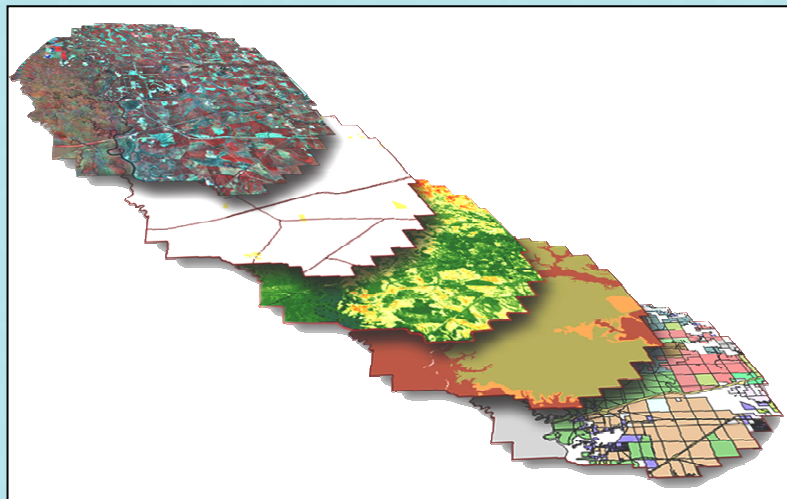




Integrating GIS and Facility Master Planning

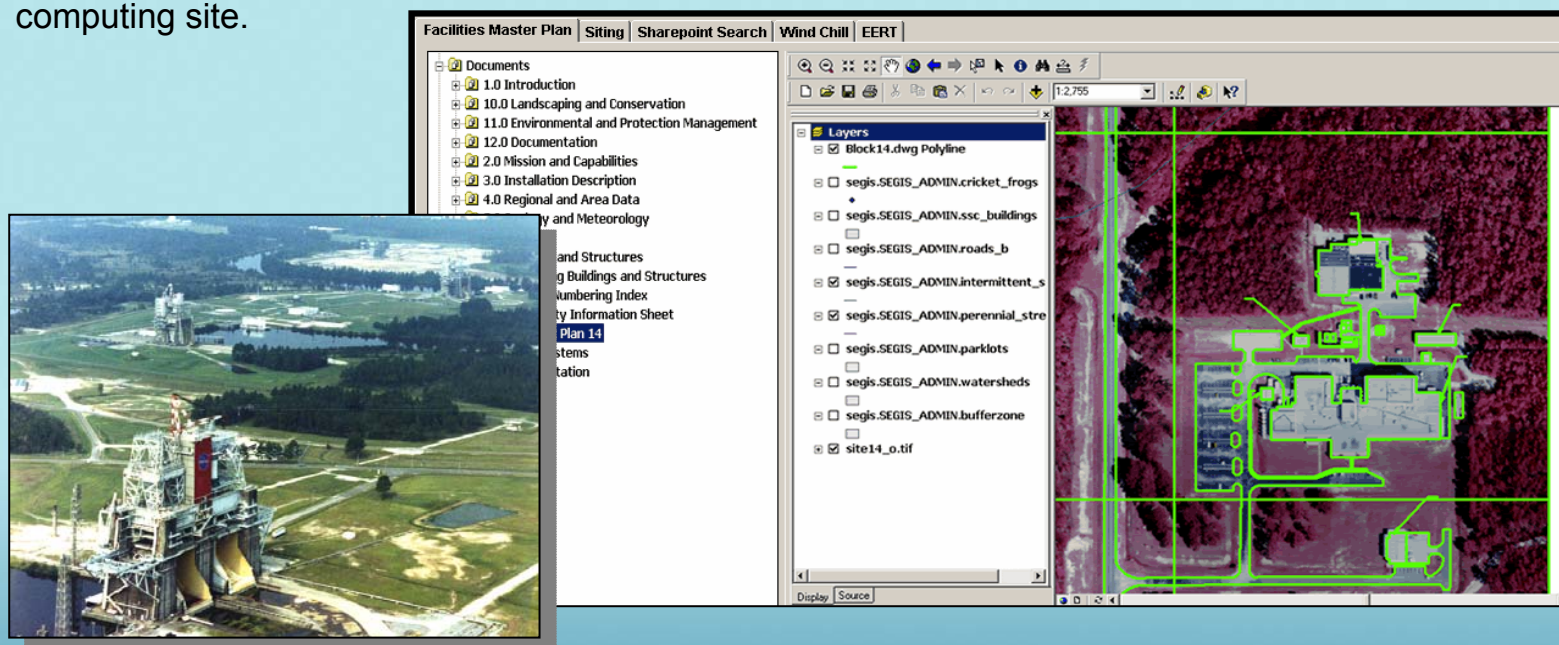
Using GIS for Facilities Management

The SSC Facilities Master Plan provides a graphic, statistical, and narrative description of land, buildings, topography, climate, resources, and operations in and around Stennis Space Center. It contains information for planning SSC's growth and expansion, and for anticipating the impact such development may have on the environment and the surrounding communities.



Decision Support Solutions

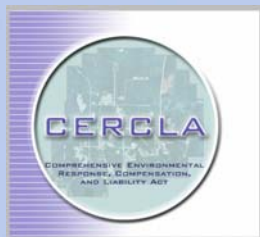
Information regarding the physical components, equipment, and infrastructure of industrial facilities are largely developed and managed with Computer Aided Design (AutoCAD) programs for applications in municipal infrastructure, utility management, gas and electric maintenance, and organizational planning. Successfully integrating these drawings and other facility management data with existing GIS and remote sensing data layers will help provide decision makers and site planners access to all relevant information pertaining to the environmental conditions, current, and planned facilities at SSC. It is the hope of NASA's Environmental Officers to create a web-enabled GIS database from unique and existing data sources such that the sum of its contents is greater than the sum of its parts. An important advantage of integrating databases is that the data is accessible for users within and outside the centralized computing site.





Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)

Cleaning Up from Past Practices



As NASA's Lead Center for Rocket Propulsion Testing, Stennis Space Center is responsible for developing and testing large liquid propellant rocket systems. Section 120 of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), mandates that the federal facilities remediate areas where hazardous waste has been generated, stored, treated, or disposed in the past. To date, nine clean-up sites have been identified at SSC, and environmental management personnel have taken a proactive approach to restore each area. To aid in this effort, a web enabled CERCLA GIS database is being developed to help inventory, monitor, manage, and restore chemically contaminated areas. Specifically, this GIS is used to measure the scope and extent of contamination, detect concentration patterns, and model the migration of contaminants.

An important aspect for environmental characterization is providing a graphic visualization of site conditions including spills, emissions, or contamination plumes. The ability to automate the production of this information is valuable for creating compliance reports for regulatory agencies, generating management reports for internal use, evaluating the progress of a remediation program, providing information in response to unforeseen emergencies, and providing outreach material to the public.

